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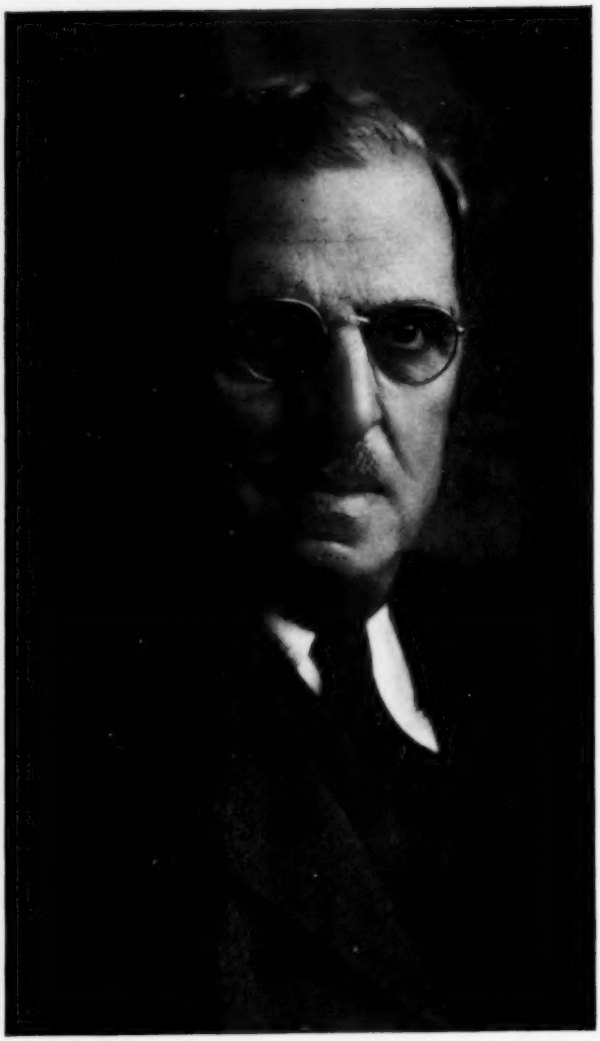

Arturo Castiglioni

Arturo Castiglioni 1874-1953

AT the annual banquet of the Ninth International Congress of the History of Medicine held at Bucharest in September 1932, there was gaiety and oratory of the type still known on occasion in the countries of eastern Europe. The members of the Congress were entertained at Villa Paradon by the brothers Karmitz of the great Rumanian pharmaceutical house. Those who participated in the feast forgathered at midnight and delicious food and drink, chosen with great care and knowledge, were served in generous fashion. The official delegate of each of the twenty-six nations represented brought greetings to the Congress. At least six languages were spoken; some addresses were brief, others long and tedious, but when, shortly after four in the morning, Arturo Castiglioni's turn came, he being the official representative from Italy, the sleepy diners were awakened with an oration worthy of Demosthenes. Dr. Castiglioni delivered his address with a verve that would have electrified any audience, and although he spoke in his native Italian, he could have employed French, German, or Spanish with equal facility. It was an unforgettable evening and a memorable Congress. For me as a young delegate from the United States it was a great occasion since it was my first meeting with Arturo Castiglioni.

Years passed; there were many friendly contacts, including the well-remembered visit he made to the United States just twenty years ago when he gave the Noguchi Lectures at The Johns Hopkins University on Renaissance Medicine in Italy. When the war began and when the *'furori fascisti'* made everything grim for many prominent leaders, Castiglioni turned his eyes westward; coming to this country in 1939, he settled in New York and for seven years spent a part of each week at New Haven where the students and the faculty of Yale University had the privilege of hearing the lectures of an eminent humanist and great Renaissance scholar—and of conversing with him on intimate terms. He asked nothing of Yale except a place in which to work and it was our good fortune to be able to give him that place in the Historical Library of the School of Medicine. He mixed freely with students and faculty in all parts of the University, but especially with those in Medicine, the School of Fine Arts, and the Department of Romance Languages; later he participated in the Area Courses designed to train prospective officers scheduled for overseas duty in

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the Mediterranean Theatre. This and much else will always be remembered.

Castiglioni not only threw in his lot with Yale, but he also became a naturalized American citizen (1946) and one of the country's most loyal advocates. Dr. Henry Sigerist in the "Epistola Dedicatoria" addressed to Dr. Castiglioni when the volume *Essays in the History of Medicine* was presented to him on his seventieth birthday wrote with deep sympathy of his transplantation to America.

> The period of adjustment was not an easy one, and we who have been close to you all these years are filled with admiration for the courage with which you made a fresh start. Many other refugees became bitter, disgruntled, critical of their new environment and sometimes even arrogant. They forgot the dangers from which they had escaped and remembered only the life they had been leading at home before they had been threatened in their security. You kept your sense of humor and your *esprit de galanterie,* and when we heard you make jokes in English with the same ease with which you used to make them in Italian, French, German or Spanish; when we heard you pay compliments to the ladies, we knew that you had begun to feel at home in the new world.
>
> We also greatly admire Mme. Castiglioni, your wife, for whom the adjustment to the new environment was infinitely more difficult. We, after all, have our books and when we have books we can do our work wherever we happen to be. A wife misses her relatives, her friends, the comforts of her former home, the infinity of little things that make life pleasant, much more than we, and there is much greater heroism in her unspectacular adjustment.

While here Castiglioni was constantly called upon to speak to Italo-American groups in the cause of better understanding and relationships and upon his return to Italy he continued this great service, acting as adviser to countless students who were seeking opportunities in the United States. He died an American citizen on 21 January 1953. Mrs. Castiglioni, his greatly cherished and understanding helpmate for fifty years, had died at Milan on 2 December 1952. They are survived by a daughter, Signora Laura Luzzatto (who with her husband and two sons lives at Milano), and a son, Vittorio, who had lived in the States during the war years but returned with his wife and two daughters to Rome at the end of the war. Three brothers also survive.

Born at Trieste, Italy, on 10 April 1874, Arturo Castiglioni had his primary education at the Trieste Classical Gymnasium (1882-1890); he then attended the Medical School at Vienna (1890-1896), taking his M.D. degree there in 1896. He spent two years in the clinical service of Professor Schroetter of Vienna, during which he contributed to his exchequer by reporting as a

journalist to the Italian newspapers *Piccolo* and *Corriere della Sera*. A much desired visit to Madrid was financed in similar fashion, and meanwhile with his customary facility he learned Spanish. Subsequently he became an intern and resident physician at the General Hospital in Trieste, and in 1899 joined the Sanitary Service of Trieste Lloyd, later becoming head of that service and continuing in that capacity until 1918 after which he became chief medical officer of the Lloyd Triestino and the Italian Lines (1918-1936). While in Vienna, Dr. Castiglioni had become interested in the history of medicine under the influence of Max Neuberger and later he held chairs in that subject at Siena (1921), Padua (1922-1938), and Perugia (1934-1938). He has also held many distinguished lectureships in the history of medicine in this country and abroad.

Castiglioni's best known work was his *Storia della Medicina*, which appeared first in 1927 and subsequently passed through two editions in Italian (1936 and 1948) and was translated into five other languages. The 1948 edition appeared in a sumptuously illustrated two-volume format. The English editions, translated by Dr. Edward B. Krumbhaar of Philadelphia, were published by Alfred Knopf in New York (1941 and 1947) and have received wide acclaim. The text has great warmth and charm and although the first edition tended to place greater emphasis on Italian medicine than on that of other countries, in his English editions he endeavored to make the book more a story of world medicine. Knopf also published the English edition of his *Adventures of the Mind* (1946).

Professor Castiglioni was an ardent humanist who believed that medicine and the sciences should be taught with the humanities as a background, and that no one could adequately understand the present position of medicine or any other science unless he knew the historical events on which the present had been constructed. He illustrated this conviction in his many published writings, of which one hundred and sixty-four journal titles were listed in his bibliography published at the time of his seventieth birthday on 10 April 1944.* He was not very systematic about keeping track of his publications and there are probably others which escaped the attention of the diligent editors of the *Bulletin of the History of Medicine*. The many tributes paid to him at that time bear elo-

* *Essays in the history of medicine presented to Professor Arturo Castiglioni on the occasion of his seventieth birthday, April 10, 1944.* Supplements to the Bulletin of the History of Medicine, No. 3. Baltimore, The Johns Hopkins Press, 1944. vi + 358 pp.

quent testimony to the regard and affection in which he was held throughout the world.

Upon his return to his native land his interest in medical history did not lessen. He added a number of titles to his bibliography and lectured the length and breadth of Italy, during the past year having given two important lectures on Leonardo—first at Rome and late in October at Perugia. He made a particular effort to bring American work to the attention of European readers by the faithful reviewing of books. And as a Consulting Editor of the *Journal of the History of Medicine and Allied Sciences* since its beginning in 1946 he has always been generous with his counsel and assistance whenever called upon. He guarded most zealously his contacts with America and gave a warm welcome to all travellers who made their way to his hospitable door. His last years have been saddened by his wife's illness and although he greeted friends with his old enthusiasm, it was plain that with the loss of her companionship had gone much of his zest for life.

Arturo Castiglioni asked little, gave much, and over the years was the Maestro to students in many countries. He leaves a heritage of rich and colorful tradition which all of us who knew him will cherish. When one walked or talked with him, one felt the warm sunshine of the Renaissance. Nor will we lose it with his passing.

JOHN F. FULTON

The Social and Political Attitudes of Midwestern Physicians 1840-1940: Chicago as a Case History

THOMAS N. BONNER*

THE relationship of the physician to the social and political environment in which he lives is influenced by a wide variety of cultural, economic, and professional considerations. In the case of the pioneer practitioner traveling the wilderness roads of the undeveloped American West, the struggle to push back the forest and fashion a new community did most to shape his social views. A sense of common purpose and common destiny inspired a general feeling of human equality which the doctor shared. The struggle for success in the West, however, was individual as well as social; a man sought to carve out for himself the largest possible stake even while he co-operated with his neighbors in necessary communal undertakings. Thus, while the early western doctor soon saw the need for local legislatures, courts, and constabularies, he was suspicious of interference from outside, especially from a strong central government at Washington.

As the nineteenth century wore on and the cultural isolation of the West was broken, economic and professional factors became more and more important in shaping the attitudes of physicians toward society and government. The rapid industrialization of the country, accompanied by a sharper division of society into the propertied and the propertyless, forced the physician to choose politically between the forces of conservatism, which rallied to the support of a laissez-faire economy, and the army of industrial and agricultural workers, many of them his neighbors, which protested its subjugation to the will of profit-driven producers. Increased professional competence was still another factor which had a bearing on the political thinking of the physician. The medical discoveries of Pasteur, Koch, and their followers armed the practitioner with knowledge and skills which inspired increased public confidence, and gave him a new position in the social order. The doctor's attention became more and more fixed on strictly professional matters, with the result that his views on political and social

* William Woods College, Fulton, Missouri.

topics became little more, in most cases, than reflections of those of the leaders of professional organizations or the editors of professional journals.

During much of the nineteenth century, the Chicago physician shared the frontiersman's view of government and society. Long after the last Conestoga wagon had disappeared, his thinking was still colored by the experience of the early years. His conception of the ideal government continued to be one that provided the maximum degree of protection with the minimum amount of interference; government should emulate the constable rather than the busybody. Society, he felt, should be equalitarian, yet allow full scope for individual initiative; were not all men born equal, if not in ability, then at least in opportunity? Both government and society should allow the individual the greatest amount of freedom consistent with the safety and well-being of the rest of the community. The pioneer doctor shared, too, the western settler's indomitable belief in human progress. Mankind was constantly moving forward, in morals, politics, and technology, according to this optimistic view, and temporary setbacks should occasion no alarm. The Chicago surgeon, Edmund Andrews, commented on this popular concept in 1856:[1]

> The subject of progress, in general, is one upon which we hear much said at the present day. The world, at least the American part of it, seems to be in partial frenzy upon it. We hear the word progress on almost every tongue. Its echoes reach us from every department of moral, social, and industrial life. It is the child's first lesson: it is the youth's first task. Ripe manhood makes an occupation of it; and mature years rejoice over its practical and beneficial results, while the octogenarian "pipes and whistles" over its novelties and wonders.

The attachment of the early Chicago physician for freedom was warm and genuine. He sincerely believed the liberal dictum that only by granting liberty to his irregular competitors would he himself be assured of freedom. He opposed regulation of medical practice on the doctrinaire grounds that it would limit individual liberty. The remedy for charlatanry, one journal declared, should not be sought in government decree, for "Man can't be cured of ignorance or insanity, nor endowed with common sense and understanding, by the force of law."[2] Chicago's first medical journal, almost in its first issue, declared that it was unalterably opposed to restrictive laws governing the practice of medicine. Such laws, declared the editor, only gave undeserved popularity to

1 *Northw. med. surg. J.*, 1856, *n.s. 5*, 184.
2 *Ibid.*, 1852, *n.s. 1*, 161-165.

those against whom they were directed.[3] A discussion by the city's leading physicians in 1858 revealed only a few favoring regulation; most of those taking part saw the improvement of medical schools and public education as the only answers to quackery.[4]

Similarly, quarantine was regarded by most physicians before 1880 as an unwarranted infringement on personal liberty and commercial intercourse. Despite the speeches and writings of Dr. John Evans, who became convinced during the cholera epidemic of 1849 that quarantine was necessary, the majority opinion held that cholera was not contagious and should not be subject to quarantine. It was doubtless more than coincidence that Evans' logical arguments were rejected at a time when Chicago was undergoing tremendous commercial expansion. The force of middle-class liberalism, with its emphasis on freedom, collided with Evans' theory of contagion with its unwelcome corollary of regulation and disruption of commerce. Chicago's physicians read the German and British authors on epidemic diseases; it was not strange that they accepted them over Evans' observations and statistics when they coincided so well with their own prepossessions. Many of the city's leading doctors—Daniel Brainard, Levi D. Boone, William B. Egan, Edmund S. Kimberly—were heavily engaged in large-scale commercial and real-estate activity and thus tended naturally to oppose quarantine, so long at least as any reasonable doubt of the validity of the contagion theory remained.

Further evidence that opposition to the theory of contagion was linked with general devotion to freedom may be gleaned from the fact that Evans, who was the only outspoken advocate of quarantine, was also the only physician of importance to call for public regulation of medicine in the 1840's.[5] The political atmosphere continued to be unhealthy for both quarantine and the regulation of medicine until well after the Civil War. As late as 1879, the editors of the *Chicago Medical Journal and Examiner* were still warning that quarantine placards were an unjustifiable attack on personal liberty:[6]

> . . . even if the profession were unanimous in their approval of warning cards, that would not make it right for the government to intrude them into the private abode of private citizens. The warning card, as a notice of sickness, is in itself harmless enough, but as the symbol of an officious intrusion by the government, it is thoroughly outrageous.

3 *Illinois med. surg. J.*, 1844, *1*, 97-105.
4 Chicago Medical Society, Minutes, Dec. 7, 1858.
5 See *Northw. med. surg. J.*, 1848, *5*, 86-88; 1849, *n.s. 2*, 230.
6 *Chicago med. J.*, 1879, *39*, 312.

With the firmer establishment of the germ theory in the course of the 1880's, this journal, like other opponents of quarantine, was forced to reverse itself. Where the injury to commerce had been put forward as an argument against quarantine heretofore, it was now argued that only immigrants, and not goods, were likely to be infected; cargoes therefore need not be delayed.[7]

The social and political views of Chicago physicians were never more strongly expressed than during the middle years of the nineteenth century. The three decades separating the inauguration of Andrew Jackson and the bombardment of Fort Sumter (1829-1861) were tumultuous years for the development of democracy everywhere in America. Spurred by a progressive Northeast and a proselytized West, the country sought to realize the democratic revolution begun in 1776 and advanced by the Jeffersonian Republicans. These were years of reform, of extension of the democratic franchise, of abolition of imprisonment for debt, of striving after that perfection which seemed attainable to the optimistic Americans of this era. Reforms and reformers held the center of the stage; anti-slavery, temperance, common schools, women's rights, and health fads all found the nation in a listening mood.

Chicago's physicians were involved in all these reform movements. Drs. Levi D. Boone, Charles V. Dyer, N. S. Davis, and William B. Egan all played important rôles in the anti-slavery and Negro colonization campaigns in the city. Dr. Dyer, indeed, was assaulted in 1848 for aiding the escape of a runaway slave.[8] Six years later, John Evans rallied the Democratic opposition to the Kansas-Nebraska bill;[9] he subsequently left the Democrats for the newly formed Republican Party, where he worked for Lincoln's nomination and election in 1860. Evans was active in other reform movements during his fifteen years in Chicago; his humanitarian efforts on behalf of the insane attracted the attention and praise of Dorothea Dix.

A number of the city's doctors were active in the temperance campaign. Serving on the strategic Reclaiming Committee of the Washingtonians (as the temperance advocates called themselves) in 1842 were Drs. Dyer, Freer, and Egan.[10] In the 4th of July celebration of that year, Dr. E. S. Kimberly acted as marshal of the Cold Water Army, while Dr. Levi D. Boone was active on the

[7] *Ibid.*, 1888, *56*, 139-141.
[8] *Chicago Daily Journal*, June 12, 1848.
[9] *Chicago Daily Democratic Press*, Aug. 12, 1854.

committee to select badges. But Dr. N. S. Davis, as in most movements in which he participated, was the most prominent physician engaged in temperance work in Chicago. His opposition to the use of alcohol, even medicinally, was so well known that it was the butt of a number of jokes among medical men. Davis eventually organized a group of interested physicians in the American Medical Temperance Society. This project occupied much of his time during the closing years of his life. Dr. Davis was one of the few men of that boisterous era to achieve the dual distinction of belonging to the Democratic Party and espousing the cause of teetotalism at the same time. No lesser man, suggested his biographer, could have risked such an inconsistency.[11]

In the common school movement in Chicago, another physician, James C. Goodhue, was especially active. His was the initiative behind the establishment of the city's first public schools. John Evans was also greatly interested in the city schools. Elected to the City Council in 1852, Evans was appointed chairman of the committee on public schools. In that position, he fought hard against the prevailing trend of selling valuable school property. When confronted with a proposed sale of more school land, he advised his colleagues that "unless they were satisfied that Chicago was done growing they were doing a foolish thing in selling any more property." Many a public official has since regretted the haste with which school lands were sold, but Evans was virtually alone at the time in opposing the trend.[12]

One of the results of the cultural isolation of the West during the nineteenth century was the development of a strong feeling of sectionalism which often expressed itself in antagonism toward the East and its institutions. Western medicine, like western literature and science, had a sharp inferiority complex with respect to the better-equipped hospitals and better-trained physicians of the East. Westerners were self-conscious about the cultural lag between East and West and often sought to conceal their feeling beneath a mask of boastful arrogance or sarcasm. Evidence of this western self-consciousness can be discovered as early as 1827 when Daniel Drake inaugurated the first medical journal published west of the Appalachians. "We trust," Drake wrote, "that our senior brethren of the East will not regard a journal in the Back-

10 *Chicago Daily American*, April 30, 1842.

11 Danforth, I. N., *Life of Nathan Smith Davis, 1817-1904*. Chicago, 1907, p. 56.

12 Bancroft Library documents (photostats), notes concerning Gov. John Evans. Given by Mrs. Evans, Mrs. Dickinson, Governor Sheldon, and John Evans [c. 1889].

woods, as altogether unworthy of their more experienced pens."[13] When the Rush Medical College opened its doors in Chicago in 1843, a special plea was made to "Western Students" to attend. Aside from offering facilities equal to those of the best eastern schools, the Rush catalogue boasted, this school had the additional advantages accruing to a location in the heart of the West, where the endemic diseases which western physicians would meet in practice could be studied at length.[14] By 1859 the growth of western medical schools had reached the point where the president of the Illinois State Medical Society could refer to the sending of students to eastern schools as a "hindrance to medical progress." This practice, he said, might have been justified at an earlier period when colleges were scarce, but could no longer be defended "for we can boast of a sufficient number of medical schools, supplied with every material necessary to impart instruction, hospitals included."[15]

Western sensitivity to criticism was severely tested by Oliver Wendell Holmes in 1848, when he referred disparagingly to the proliferation of low-grade medical schools in the West. The wounded vanity of western professors found some solace in composing stinging rebuttals to Holmes' charges. Austin Flint, who taught at Rush in the 1840's, attacked Holmes' complacency with regard to the medical schools in his native New England. The problem of medical education, Flint insisted with considerable justification, was national, not sectional. There were a number of schools in small, provincial towns west of the mountains, it was true, but what of schools like Woodstock, Castleton, Hanover, and Bowdoin in Holmes' New England?[16] Daniel Brainard, president of Rush, also vented his spleen at Holmes' charges:[17]

> The statement has recently been made by a Dr. Holmes, professor in a not very flourishing medical school at Boston, that the multiplication of medical schools at the West is doing great mischief in the profession. . . . For a country possessing all the advantages for containing a large population, calculated from extent and situation to be the center of the republic . . . to be dependent on some villages a thousand miles off for its physicians, would certainly present an anomaly in the general order of things.

Not only was the West prone to resent eastern superiority and criticism, but that section shared with the country as a whole an intense feeling of inferiority with regard to European science and

13 *West. J. med. phys. Sci.*, 1827, *1*, ix-xii.
14 Rush Medical College, *Annual Announcement*, 1844, 7.
15 *Chicago med. J.*, 1859, *n.s. 2*, 1848, 48-49.
16 *Northw. med. surg. J.*, *n.s. 1*, 1848, 133-142.
17 Ingals, E. Fletcher. "The life and work of Dr. Daniel Brainard," *Bull. Alumni Ass. Rush Medical College*, 1912, *8*, 8.

culture. This sense of cultural and scientific backwardness was transformed into burning hostility whenever a European, usually an Englishman, chose to taunt Americans with the unimportance of American contributions to art, literature, or medicine. "In the four quarters of the globe," wrote Sydney Smith in his famous article in the *Edinburgh Review,* "who reads an American book? or goes to an American play? or looks at an American picture or statue? What does the world yet owe to American physicians or surgeons?"[18] It was the last question which greatly irked the American physician of 1820. The *Philadelphia Journal of the Medical and Physical Sciences* immediately fixed this hated phrase upon its masthead and kept it there for seven years as a prod to American medical men.[19] American medicine, like American science and art generally, was striving for independence from European influences during most of the nineteenth century; by 1900 the condescending attitude of Europeans toward the New World had all but disappeared. A marked deference to European medicine remained, however, as the result of the birth and growth of bacteriology in the Old World.[20] When Northwestern University constructed a new laboratory building for its medical school in 1893, no greater boast could be made than it had "been inspected and praised by Professors from eastern and even European universities."[21]

Western journals and medical men resented American subservience to foreign science even more strongly than their eastern colleagues. The nationalistic feeling of the country ran higher on the frontier, and the Westerner's strong pride in himself and his independence was injured when he saw American medical men pouncing upon the scraps of information which fell from European tables. The noted Chicago and Civil War surgeon, Edmund Andrews, complained in 1856 that after seventy-five years the United States possessed no original nor independent medical literature; the writing of Americans was confined to illustrating and commenting upon European texts. He censured his colleagues for ignoring the important work of Professor Brainard at Rush; he reminded them that Brainard had been warmly received in Paris. He recalled for American physicians, too, the investigations of Daniel

18 Riesman, David. "American contributions to nosography," *New Engl. J. Med.,* 1938, *219,* 592.

19 Eckman, James. "Anglo-American hostility in American medical literature of the nineteenth century," *Bull. Hist. Med.,* 1941, *9,* 34-36.

20 Shryock, Richard H. "Public relations of the medical profession in Great Britain and the United States: 1600-1871," *Ann. med. Hist.,* 1930, *n.s. 2,* 327.

21 *Northwestern University Record,* June, 1893, 33-34.

Drake and Benjamin Dudley, and Benjamin Rush's doctrine of the unity of fevers.[22]

Brainard himself was vociferous in his denunciation of American servility to Old World ideas. This servility, he charged, was responsible for the uncritical adoption by American physicians of such stultifying European doctrines as universal purgation and heroic medication, as well as the sectarian teachings of homeopathy, hydropathy, and other "pathies." He attacked the therapeutic nihilism of European medicine: "All Louis' boasted researches on phthisis did not enable him to do more than pronounce the disease incurable, and are even less serviceable than the discovery of the use of cod liver oil." It was the West, said Brainard in 1852, which would deliver the country from its bondage to European medicine: "Held subservient . . . to the East, as the East to Europe, for its books and doctrines . . . it will soon have opinions of its own."[23] Three years later, all the physicians of Illinois were urged by the retiring president of the state society to assist in felling the "European monster:"[24]

> We must do our own thinking and investigating, and we must be guided by our own philosophy. So long as we are satisfied with merely imbibing the froth and scum of medical science, which floats to us through the medical press from the other side of the Atlantic, so long will our native energies remain to a great extent inactive; so long will we remain without a literature characteristic of ourselves, or which will represent in a favorable light the medical mind and talent of the nation; and so long shall we remain comparatively destitute of ample medical libraries.

But western antipathy to European science began to fade in the last quarter of the nineteenth century. The development of better American schools, hospitals, and doctors, coupled with the accomplishment of Europeans in bacteriology and medicine, promoted a spirit more akin to respect than envy. The triumph of American surgical appliances at the Paris Exposition of 1868, moreover, did much to soothe hostile feelings in this country.[25] When the English surgeon, John Erichsen, came to the United States in 1875, he received such a warm reception that he refused to accept it as personal tribute, professing to think of it as an American compliment to the surgical profession of Great Britain.[26]

22 *Northw. med. surg. J.*, 1856, *n.s. 5*, 184-192.

23 *Ibid.*, 1852, *n.s. 1*, 131-134.

24 Andrews, Charles N. "Valedictory address . . . on retiring from the presidency of the Illinois State Medical Society," *Trans. Ill. med. Soc.*, 1855, 81.

25 *Chicago med. J.*, 1868, *25*, 219-230. The triumph of the Americas was even greater, gloated the reporter, "when we remember that it was gained on European ground and that judges in this great international contest were Europeans."

26 *Ibid.*, 1875, *32*, 340-341.

Only a lingering sensitivity to English and continental criticism marred the relations of the American profession with its foreign counterparts in the closing years of the century.[27]

Western resentment at the condescension and exclusiveness of eastern journals and societies, however, remained strong into the twentieth century and was indeed still a factor in any sociological analysis of the profession at mid-century. An interminable row between doctors east and west was begun in the early 1880's when the New York State Medical Society voted to permit consultations with homeopaths. Western physicians were strongly opposed, especially in Chicago where most of the country's homeopaths were congregated. The American Medical Association voted in 1882 to refuse delegates from New York on the ground that their action had violated the Association's code of ethics. *The New York Times* cauterized the injury to East-West relations by declaring that there was "probably more medical skill and scientific knowledge among the members of the New York Medical Society than . . . among all the members of the American Medical Association. If the latter can do without the New York doctors, most assuredly the New York doctors can do without the eminent medical practitioners of Oshkosh and Okolona."[28]

The American Medical Association established its journal in Chicago the year following these events with a Chicagoan, N. S. Davis, as its first editor. Scarcely had the first issue of the new journal reached the doctors of the country when a number of eastern journals began publishing caustic criticisms of the enterprise and particularly of Davis' editorship. The *New York Medical Journal* went so far as to publish lists of the typographical errors found in the Association's journal. Davis, himself an Easterner by birth and training, could not long endure these critical onslaughts without replying in kind. He culled a few mistakes from eastern journals and printed them in the Association journal with this accompanying remark: "Had either of these blunders occurred in THE JOURNAL or any other outside of 'one of the great *Eastern* cities' it would have been held up as a sample of incompetent provincial work for the next six months."[29] As an educator, Davis frequently found himself in sharp disagreement with the attacks made by spokesmen for eastern schools against the proprietary

27 For an example of continued sensitivity to English criticism, see the *Chicago med. J. Exam.*, 1882, *45*, 620-625.

28 Quoted in *Chicago med. Times*, 1882, *14*, 155-156.

29 Fishbein, M. *History of the American Medical Association*, 1847 to 1947. Chicago, 1947, p. 118.

schools of the West. He was forced to remind these critics that the East had some low-grade, proprietary institutions, and that the West was passing through a different stage of physical and cultural development than the East. When several of New York's schools withdrew from the American Medical College Association in 1880, Davis confessed that "we are a little out of patience with this persistent Pecksniffian assumption that there is nothing of value or importance in the medical institutions of this country outside of that circumscribed strip of territory lying between the eastern part of the Alleghenies and Plymouth Rock."[30]

The Association of American Physicians was organized in 1886 largely by eastern medical men, many of whom had withdrawn from the American Medical Association in protest at its action against the New York delegation. This body was immediately characterized by one Chicago editor as a "mutual admiration society of medical mugwumps and man-milliners."[31] Steps were soon taken to build up an exclusively western society which became known as the Mississippi Valley Medical Association. The split between East and West spread also to specialty societies. A Western Ophthalmological, Otological, Laryngological and Rhinological Association, for example, was founded in 1896 as a protest against the exclusiveness of eastern-dominated national societies. Such western societies tended to be open to all qualified applicants, unlike many of the eastern groups, where membership was limited to a certain number.[32] The rift between East and West has shrunk considerably in the twentieth century—but there continued to exist as late as 1950 a number of supposedly national societies which in practice tended to restrict membership to either the eastern or western part of the country.

The rapid industrialization and urbanization of the United States after the Civil War had an important bearing on medical thinking regarding political and social questions. In Chicago, physicians were poorly organized before this time and tended to share the attitudes of their neighbors and other townsmen on political and social problems. The factors which affected the political beliefs of doctors were those which touched citizens everywhere: family political connections, economic status, social position, and personal feelings; there was no recognizable "medical opinion" on other than scientific topics until the closing decades of the century.

30 *Chicago med. J. Exam.*, 1880, *41*, 504.
31 *Wkly med. Rev.*, 1886, *14*, 323-324.
32 Lebensohn, J. E., "Ophthalmology in Illinois," *Illinois med. J.*, 1940, *77*, 484.

But the economic expansion and growth in population of the city meant that the profession had to become more differentiated and better organized to meet increasingly complex medical needs. Medicine became more and more specialized, regimented, and compartmentalized in response to the demands of the industrial order. Physicians tended gradually to make up a distinct economic and social group with attitudes which could be identified as those of the profession as a whole. In a word, physicians, like bankers, industrialists, clerks, and laborers, now had a definite stake in certain political questions.

The political orientation of Chicago's physicians in the final quarter of the nineteenth century was definitely in the direction of the conservative elements in the community. As a strong middle-income group, they saw their interests coinciding with those of the commercial and industrial leaders of Chicago. With several notable exceptions, the articulate voice of medicine was raised against the use of tax funds for the amelioration of the plight of the lower classes through slum clearance, expansion of public health work, and unemployment relief. Medical writers were more addicted than most to a Spencerian fatalism regarding the welfare of destitute persons. The works of Herbert Spencer and Thomas Huxley were quoted as veritable Bibles of moral behavior when the ethical aspect of leaving the unemployed to the vagaries of private charity was questioned. The work of the Illinois Board of Health was challenged frequently on the ground of Huxley's dictum that it was better for people to learn to care for themselves than to depend on the state for protection. An example of the type of ridicule heaped on the state board in the 1880's was the following characterization of its work by a Chicago medical journal:[33]

> Mousing after irregular practitioners, "steering" medical students, nursing their pet medical colleges, and stuffing the newspaper reporters with Falstaffian narratives of their combats with the quacks—these seem to be the favorite pursuits.

Not until the last decade of the century did Chicago's doctors first become aware of their political power. They found that representatives of organized medicine could exert considerable pressure at Springfield on behalf of legislation favorable to the profession and against bills inimical to their economic or professional welfare. Medical politicians, who sensed the power inherent in an organized profession, fought for office in the Chicago Medical So-

33 *Chicago med. J. Exam.*, 1884, *48*, 193.

ciety and in the specialty societies. In some instances, they made themselves obnoxious to their colleagues, as was evidently the case with the editor of the *Weekly Medical Review*: "The medical politician is one who for self-aggrandizement pushes himself and friends to the front, captures all the offices of the medical societies, courts the notoriety of the newspapers, and is about as reliable as the average ward bummer in municipal politics."[34] By 1896, Dr. Arthur Reynolds saw political potential beyond mere medical questions in a tight organization of physicians:[35]

> There are nearly 4,000 medical practitioners in Chicago who could, if they would, control votes enough to turn any election that is held to whatever ticket they choose. In that way they could demand and dictate not only the administration of medical institutions, but all institutions and all offices.

Chicago's physicians tended in the closing years of the century to adopt conservative views on national political questions. The feeling against labor organizations was very intense in the city, especially after the Haymarket Riot of 1886, when a number of policemen were killed by a bomb of unknown origin while attempting to break up a labor protest meeting in Haymarket Square. Medical men shared in this general antipathy and a number of their journals called for the suppression of all unions. The abolition of trade-unions, argued the *Medical Standard,* would not militate against basic American rights, because no punishment was too severe for those who "defy all principles of free labor."[36] The enormity of strikers' outrages was cited whenever the struggle between capital and labor was discussed. When a Chicago doctor was brutally murdered on the third anniversary of the Haymarket Massacre, the coincidence was not lost on physicians.[37] Several medical journals asked for a halt to immigration because, it was felt, foreigners were responsible for all the labor agitation and violence of these turbulent years. Physicians tended, too, to support high tariffs during this period as part of their general adherence to the conservative program. One Chicago homeopathic journal went so far as to oppose the importation of surgical instruments duty-free because[38]

> America already contains too many undesirable exotics; too many demanding foreign flags on public buildings; too many anarchists, whose mission it is to destroy; too many socialists, to disturb established order;

34 *Wkly med. Rev.*, 1890, *22*, 354.
35 *Chicago med. Recorder*, 1896, *10*, 267.
36 *Med. Standard*, 1899, *22*, 453.
37 *Med. Era*, 1889, *7*, 193-194.
38 *Ibid.*, 1888, *6*, 97-98.

too many "strikers" to urge to violent methods; too many alien paupers, unsound of mind and diseased of body. These gangrenous ulcers came into our country duty-free. And now we are asked to put American labor into competition with the source of all this evil.

Not all medical men, of course, agreed with what seemed to be the dominant view of the profession regarding political matters. There were a number of physicians, particularly those in public health work, who espoused the cause of the workers in their fight against capital, and of the poor in their struggle for relief. Health commissioners, such as John Rauch and Oscar De Wolf, recognized the legitimate nature of most of labor's complaints. They knew at first hand the high mortality rates among the families of poorly paid workers, forced to live under abominable conditions in slums, lacking proper food, clothing, shelter, and medical care. It was as much the responsibility of government, De Wolf told the Chicago Medical Society in 1879, to protect these unfortunates from disease as from crime. The only property of the laborer was his health and ability to work; these, De Wolf insisted, society was bound to protect.[39] A city statistician named Gruenhut went even further in a report on labor statistics in 1889. This remarkably humane and enlightened document revealed a sympathy for the oppressed and a grasp of the economic and moral aspects of the whole problem which were out of keeping with Gruenhut's humble position. The capitalists who were responsible for making over the face of Chicago and for bringing the human misery, deprivation, and sorrow that went with that transformation, were, in his view, responsible for solving the great problems of industrial civilization. Gruenhut summed up brilliantly the humanitarian, moral, and economic justification for such reforms as the eight-hour day, abolition of child labor, and closing of work-places on Sunday.[40] He challenged leaders of public opinion to support this program; the alternative, he asserted elsewhere, was "legal and social interference with the present established order of business arrangements." The way to halt the march of socialism, he warned, was not to crush labor unions but to grant the legitimate and necessary reforms for which labor was crying.[41]

One of the most remarkable rebels against the conservative sympathies of organized medicine at the close of the nineteenth century was a private physician, Bayard T. Holmes. He had come to Chicago in 1871 after a farm boyhood in Vermont and a pio-

[39] Chicago Medical Society, Minutes, Oct. 6, 1879.
[40] Chicago Department of Health, *Annual Report*, 1889, 83-114.
[41] *Ibid.*, 1894, 217.

neer's existence on the Minnesota prairie. His rural background did not prepare him for what he was to find in the great metropolis of the Midwest. As a boy of nineteen, Holmes was entranced by the hustle, the impatience, the shrillness of life in the roaring city. His impressions proved to be indelible; he never forgot his own experience when he later observed the plight of persons caught and confused in the relentless and impersonal process of industrialization. Holmes attended the Chicago Homeopathic Medical College, and later the Chicago Medical College, receiving degrees from both institutions. He won an interneship at the Cook County Hospital in 1884 at the age of thirty-two, then established a private medical practice of his own a few years later. Aside from an abiding interest in politics, Holmes made important contributions to medical education, the science of bacteriology, and the establishment of medical libraries in Chicago.[42]

Holmes was keenly sensitive to the newest currents in political and social thought. His delicate nature rebelled at accepting the social *status quo* as a desideratum for all time. During his interneship at the County Hospital, he was moved to compassion by the poverty and helplessness of the jobless and the underpaid. While yet an interne, he met and befriended a scholarly Russian Jew, a patient at the hospital, who introduced him to the social thought of Karl Marx. He subsequently fell under the benevolent influence of Florence Kelly of Hull House, who worked with him in investigating health conditions in the sweating industry in Chicago. Holmes conducted a clinic for the homeless and unemployed during the terrible depression winter following the Columbian Exposition of 1893 and did everything in his power to induce the public authorities to act. He worked hard for reform; he undertook the organization of interested Christians in a reform group known as the National Christian Citizenship League.[43]

Spurred on by humanitarian sympathy, Christian altruism, and the writings of Marx and Henry George, this gentle and humane physician worked out his own social and economic philosophy. The limit of man's productiveness, he reasoned, had not yet been reached, yet mankind was confronted with the phenomenon of overproduction with its attendant depressions and human misery.

42 "Bayard Taylor Holmes," *Dictionary of American Biography*, *9*, 161. For a fuller sketch of Holmes' life and work, see Bonner, T. N., "A forgotten figure in Chicago's medical history," *Journal of the Illinois State Historical Society*, 1952, *45*, 212-219.

43 Holmes, B. "The origin of the economic conscience; a country-bred boy's education in economics," *Med. Life*, 1924, *31*, 260-263. Editor Victor Robinson devoted the entire July 1924 issue of *Medical Life* to tributes to Holmes and the printing of two of his last essays.

"There is too much wheat, too much flour and too much bread, therefore, the economists say, women and children must starve. There is too much coal and too much oil, therefore they must freeze." The answer to this riddle, Holmes felt, was that there was, in reality, enough and more than enough for every man to live in decency, if not in comfort; but the great problem of distribution had yet to be solved. His personal experience informed him that not just the drunken and the shiftless starved, as defenders of the *status quo* charged; he had seen the half-starved bodies of the slum children and treated them for dietary diseases. It was the unemployed who were driven to crime and delinquency and their salvation should be the first goal of political action. Public ownership of the means of production and distribution, he concluded with the socialists, was the only effective answer to the indifference of owners of industry to the well-being of the employed and unemployed alike.[44]

In 1895 Holmes was persuaded to run as the People's Party candidate for mayor of Chicago. All the forces of discontent which were to erupt in the tumultuous campaign of William Jennings Bryan the following year were evident in the Holmes campaign. The liberal lawyer, Clarence Darrow, was chairman of the convention which nominated Holmes, the socialist supporters of Eugene Debs rallied to Holmes' candidacy, and Henry Demarest Lloyd took an important part in the campaign. Populists, socialists, single-taxers, progressives, and liberals of all shades supported the mild physician, but all to no avail. He was defeated; he never ran again for public office.[45]

The closing years of this unusual doctor's life were spent in another humanitarian cause. His son was stricken with dementia praecox in 1906; his death affected Holmes deeply, and he resolved to quit medical practice and devote the remainder of his life to study of the mysterious affliction which claimed his son's life. With characteristic energy he undertook basic studies in the field of mental disease, established a journal devoted to dementia praecox, and secured a floor of the Psychopathic Hospital of Chicago for his investigations. His death in 1924 attracted little attention but it brought from Graham Taylor, the noted social worker, the following fine tribute:[46]

44 Holmes, B. The confession of a socialist. MS., n.d., Crerar Library.

45 Scrapbook of clippings on Bayard Holmes, medical papers and typewritten manuscripts, Crerar Library.

46 "A letter from Graham Taylor," *Med. Life*, 1924, *31*, 253.

> On one occasion, when we were together on a western Chautauqua platform, he was so deeply moved with the sorrow of the East London poor, which he was describing that he ceased speaking, left the platform, and went out into the open to be by himself until he could control his voice. . . .
>
> Dr. Holmes had the courage not only of his convictions but also of his sympathies. He was unafraid and not ashamed to think ahead of his time, to feel deeply and to express his feeling freely, to stand with and for the mute many against the dominant few, or to stand alone and dare to fail. . . .
>
> Skillful surgeon and spirited citizen, he ministered to the public health at any cost to private practice, to "the mind diseased," and to the welfare of the body politic. He served his generation by seeking the coming of the better day, and died not until he saw its early dawning.

The impact of industrialism was one important factor which helped to shape the thinking of physicians in the late nineteenth century; the Darwinian theory of evolution was another. Promulgated as a strictly scientific hypothesis in 1859, the moral and religious implications of Darwin's theory stirred up a maelstrom of controversy in the years following the Civil War. Even scientists were at first unable to examine the question dispassionately because of deep prejudices and feelings. The theory of evolution collided head-on with the religious doctrine of the special creation of man in God's own image; few public figures dared embrace evolutionism openly. By the middle 1870's, however, the hypothesis was generally accepted by biologists and other scientists, while the struggle for acceptance had shifted to a more popular level. A number of popularizers of the Darwinian theory, such as the Englishman Huxley, undertook extensive writing and lecture campaigns during these years. More significantly, some writers sought to apply the evolutionary hypothesis to social as well as scientific phenomena. Herbert Spencer, for example, created an elaborate social philosophy which had as its co-ordinates the superiority of existing economic arrangements and the futility of resisting a deterministic evolution. Why palliate the hunger and misery of the lowly when that was nature's salutary method of eliminating those no longer able to compete? Such a philosophy provided the perfect rationale for the business community which found the laissez-faire economic doctrines of Adam Smith and John Stuart Mill beginning to wear thin.

Evolutionism found little support from Chicago's medical men even in the 1870's. Physicians, despite their closeness to the struggle, outrivaled clergymen in their denunciations of the Darwinian hypothesis. Their opposition was based not on scientific but on religious grounds, a curious anomaly in an age supposedly nursed on the independence of the scientific mentality. The Rush Medical

College valedictorian declared in 1872 that he preferred the theology of revelation to the "theology of man." He was gratified to know, he continued, that the Rush faculty was virtually unanimous in asserting "that they do not regard men as baboons, nor the descendants of baboons."[47] The medical journals, too, were slow to accept evolution. The *Chicago Medical Journal* compared Darwin's theory with "infinitesimals, animal magnetism, womb burning, Newtonism, and hobby-riding in general."[48] The first recorded mention of Darwin at a Chicago Medical Society meeting came in 1874, when reference was made to "his slanderous theory of human origin."[49]

The Chicago Academy of Science was divided on the question throughout the 1870's. Dr. James S. Jewell, a pioneer neurologist, sided with the majority who were anti-Darwin and even wrote a book to disprove the theory.[50] Bayard Holmes, though not yet a physician, was one of the few to accept evolution in the early 1870's; he was considerably confused, however, by the opposition of Louis Agassiz, with whom he had spent a summer in study.[51] Many physicians found themselves in the position of De Laskie Miller, a professor of obstetrics at Rush, who leaned toward evolution, yet could not accept it at the sacrifice of religious principle. With his minister beside him on the platform, Miller sought some compromise in 1874 between the revelations of theology and the demands of science. To be true, he argued, Darwin's theory "must and will be found in accord with religion and revelation." He tried to harmonize evolutionism with separate creation by citing the biblical assertion that in God's view a "day is as a thousand years." Only the Bible, he concluded, could provide the answer to the ultimate origin of life; only revelation provided a satisfactory explanation of the existence of such a marvelous work as man.[52]

It was on the basis of just such a compromise that most of Chicago's doctors accepted the theory of evolution in the 1880's. A number of physicians continued to speak out against it, but no longer with the noisy confidence of membership in a majority. When Amos Sawyer, a Hillsboro, Illinois, practitioner, attacked Darwinism at a meeting in 1884, he tried to show that the evolu-

47 *Chicago med. J.*, 1872, *29*, 5-7.
48 *Ibid.*, 1870, *27*, 567.
49 Chicago Medical Society, Minutes, Jan. 19, 1874.
50 Moyer, Harold N. "James Stewart Jewell," *Bull. Soc. med. Hist., Chicago*, 1925, *3*, 491.
51 Holmes, Bayard. "Faith, evolution and evolution clubs," *Chicago med. Recorder*, 1922, *44*, 118-120.
52 *Chicago med. J.*, 1874, *31*, 199-202.

tionary hypothesis was "contrary to the evidence," rather than attempting to shout it down. His conclusion, however—that it was unreasonable "to suppose that God would bestow His Divine Essence (the soul) on so repulsive a being as an ape"—was no more scientific than that of earlier adversaries.[53] Opposition faded rapidly in the latter 1880's. In 1890 an Evolution Club was formed in Chicago with medical men constituting a high proportion of the membership.[54]

The acceptance by medical men of the evolution theory gave them further arguments against the extension of public health work. The "survival of the fittest" concept, when applied to modern industrial life, gave a theoretical justification for refusing to render free medical and other aid to the poor; for by salvaging those whom nature intended to eliminate, the strength of the entire race would be weakened. Health Commissioner De Wolf found it necessary to protest to the Chicago Medical Society in 1879 against "the doctrine of the survival of the fittest as applied to sanitary matters."[55] The *Chicago Medical Journal and Examiner,* whose editors included some of the city's leading doctors, explained its position at length the same year:[56]

> It is frequently stated that the poor should be protected by the government against the causes of disease which are said to infest the habitation of the lower classes. It is true that certain diseases are more often encountered among the poor than among the rich, but the reverse of the proposition is also true. Every class of people has to contend with its own peculiar difficulties; and if it is right for the government to assume the protection of any one class, there is no reason why it should not equally assume the protection of all. It is the lazy people and their sentimental friends who are always calling for government aid. If now you undertake to protect this fraction of the community, you have to protect it against the consequences of idleness, luxury, intemperance and vice—thus interfering with the operation of the wholesome monitory laws of nature; and you do it at the expense of the meritorious classes of society. Having accustomed such worthless people to rely upon government for protection against small-pox, and scarlet fever, and syphilis, and diphtheria, and sewer-gas, and scabies, it will not need the passage of many generations before they will demand protection by the government against the cold and hunger and nakedness for which they should themselves make provision. . . . This is the way in which Communists are produced; and a government which adopts the protective policy may thank itself alone for the growth of Communism and Socialism among its citizens.

53 *Wkly med.* Rev., 1894, *10,* 403-406.

54 Holmes, B. "Faith, evolution and evolution clubs," *Chicago med. Recorder,* 1922, *44,* 120. For further examples of anti-evolutionism among Chicago medical men in the 1880's, see Clevenger, S. V. *Fun in a doctor's life,* 194-195, *Chicago med. J. Exam.,* 1882, *45,* 615-616, and *Chicago med. Times,* 1890, *22,* 500-501.

55 Chicago Medical Society, Minutes, Oct. 6, 1879.

56 *Chicago med. J. Exam.,* 1879, *39,* 319.

It was not long after the advent of the germ theory of disease until it was related to the Darwinian struggle for existence. Ottomar Rosenbach in Germany had declared that disease was a special case of the struggle for existence, and was one of the means by which the natural selection process operated.[57] In Chicago, Henry Gradle stated in 1882 that "In the light of the germ theory, disease is a *struggle for existence between the parts of the organism and some parasite invading it.* From this point of view, diseases become a part of the Darwinian programme of nature."[58] Why then, argued the opponents of public health measures, should large sums of money belonging to the healthy classes of the community be spent in prolonging the lives of those whose bodies unfitted them to overcome the normal hazards of life?

These concepts borrowed from Darwin and his imitators served, nevertheless, as the basis for a considerable amount of speculation concerning the rôle of disease in natural selection. The *Medical Review,* noting the increase in cancer in the closing years of the nineteenth century, suggested that it was due to the successful attack on the infectious diseases, which allowed many persons "with weak constitutions" to survive childhood and middle life only to face an attack of carcinoma in their later years.[59] Henry Favill, noted Chicago internist, examined the Darwinian struggle with respect to disease in 1905 and concluded that illness was not completely selective. He was convinced of the "power of nature to breed out weakness and viciousness," but recognized that it was not always the weak who were weeded out by disease in the human struggle for existence.[60] In 1907 another Chicago journal signified its acceptance of the "social Darwinist" principle with respect to disease. By aiding the unfit to survive and reproduce their kind, wrote the editor of the *Medical Standard,* the average resisting power of the race would be lowered.[61] In the first quarter of the twentieth century, a few Chicago medical men continued to use the doctrine of the survival of the fittest as an argument against extending further medical and economic aid to the destitute. As late as 1924, William Allen Pusey, famed Chicago dermatologist,

57 Rosen, George. "Disease and social criticism; a contribution to a theory of medical history," *Bull. Hist. Med.,* 1941, *10,* 10.

58 Gradle, Henry. "The germ theory of disease," *Pop. Sci. Mon.,* 1883, *23,* 578.

59 *Med. Rev.,* 1899, *39,* 244-245.

60 Favill, Henry B. "Speech delivered at the University of Chicago, June, 1905," in: *Henry Baird Favill; a memorial volume,* John Favill, Comp. Chicago, 1917, 178-196.

61 *Med. Stand.,* 1907, *30,* 116-117.

declared in his presidential address to the American Medical Association:[62]

> It is clear that our civilization is committed to a sort of socialism, to the effect that the economically fit and competent shall take care of the weak and inefficient. It is an unconscious endeavor to set aside the law of natural selection and to counteract nature's cruel but salutary process of eliminating the unfit.

More than one authority has reminded men of Pusey's persuasion that the medical profession itself has no reason for existence other than counteracting nature's "cruel but salutary process."[63]

In the early years of the twentieth century, most physicians and their publications became more conscious of politics and social problems than they had been since the pioneer era. During the Progressive Era, medical men shared in the general enthusiasm for constitutional and legislative reforms aimed at making the American social system more equitable and the American democracy more responsive to the people. In sharp contrast to their earlier views, Chicago's medical publications now espoused such reforms as workmen's compensation, slum-clearing, and abolition of child labor. The Progressive interest in constitutionalism was reflected in the concern of physicians for making their societies more representative and in the democratic movement within the American Medical Association. Everywhere there was evidence that the medical profession had joined with other middle-class, normally conservative, groups in providing the impetus by which the liberal reforms of the first decade and a half of the twentieth century were achieved. "There is a progressive movement," intoned the new president of the Chicago Medical Society in 1912, "which is extending over the entire land today in all activities of society for the betterment of everything, and I hope that it will come to your honorable body and inspire you all for good work and friendly gatherings at all of the meetings."[64]

The *Medical Recorder,* under the editorship of a representative board of Chicago physicians, illustrated medicine's new social consciousness in the Progressive period. Numerous editorials were written dealing with the problems of capital and labor, slum housing, women's suffrage, workmen's compensation, and malnutrition among the poor. Even more space was devoted to political prob-

62 Pusey, William Allen. "Some of the social problems of medicine," *J. Amer. med. Ass.*, 1924, *83*, 1905.

63 See, for example, Winslow, C.-E. A. *The road to health,* New York, Macmillan Co., 1929, pp. 130-131.

64 Chicago Medical Society, Minutes, Oct. 8, 1912.

lems at the local level; a surprising proportion of the contents of this periodical was devoted to political and social topics not immediately connected with medicine. Never before or since have medical journals exhibited such a deep concern for civic and national problems. When workmen's compensation was widely debated in the first decade of the century, the *Recorder* published a series of scholarly articles on the subject. Editorials followed, outlining the advantages of compensation laws as a practical, as well as a humanitarian, means of averting social upheaval. Among many other social reforms backed by the *Recorder* at this time was an inheritance tax to eliminate "swollen fortunes."[65]

Other journals participated in the reform campaigns. The *Medical Standard, Illinois Medical Journal, Clinique,* and *Journal of the American Medical Association* all devoted some space to the pressing questions of the day. Several of these periodicals attacked the clergy for their failure to join with them in the fight for reform. One of them criticized sharply the continued clerical references to ignorance and drunkenness as the sole causes of poverty, while another applauded the decreased popular interest in otherworldliness.[66] The attention of mankind, declared the editors of *Clinique,* can not be "averted from present wrongs by glowing pictures of a better world to come." The *Medical Standard* was concerned especially with the condition of the slum-dwellers. In 1913, this journal compared Chicago's slums to those of Europe to the disadvantage of the former:[67]

> All through northern Europe the poor are better provided for than they are in America, which is becoming more and more a land of contrasts. The able man finds ready opportunity to get ahead in this country, and there are [*sic*] an abundance of "big prizes" for the brilliant; but the average person is finding it harder and harder to keep his head out of water, and the mediocre . . . soon learn that the United States has little of the "milk and honey" for them. Our great cities are filled with dirt, squalor and wretchedness in a degree only rivalled abroad by places like Cairo and Naples.

The Chicago Medical Society also felt the spur of liberal thought in the first decade of the twentieth century. In 1902, a committee was formed to assist and co-operate with the Civil Service Reform League.[68] The following year it was unanimously re-

65 *Chicago med. Recorder,* 1901-1910, *passim, especially* 1909, *31,* 648-649. Among the members of the twenty-one-man editorial board at this time were Archibald Church, E. Doering, Junius C. Hoag, Franklin H. Martin, S. C. Plummer, Arthur R. Reynolds, and Edmund Andrews.

66 *Med. Stand.,* 1898, *20,* 75; *Clinique,* 1908, *29,* 247-249.

67 *Med. Stand.,* 1913, *36,* 388-389.

68 Chicago Medical Society, Minutes, Oct. 29, 1902.

solved that "the members of this Society will use their influence collectively and individually to secure the passage of the child labor law."[69] Other discussions favorable to slum clearance and workmen's compensation were held. The Society's council became angry in 1910 at slanderous references in a report of the state medical society to the "women, negroes and foreigners" who attended Chicago's medical schools. A faculty member of one of the schools arose in the council meeting to admit that "we have had Japs . . . Egyptians, Indians and representatives of various other races and I must oppose any report of any committee that seeks to gain weight . . . by drawing upon the very lowest prejudice in the human body—the race prejudice."[70]

Many of Chicago's leading physicians came to look with increasing favor during these years on a larger rôle for government in medical affairs. When the Chicago Medical Society censured Health Commissioner Evans in 1909 for making certain vaccines and drugs freely available to victims of epidemic disease, the *Medical Standard* came to Evans' support. An editorial compared the society's attitude with the panic which possessed workingmen at the introduction of machinery; some members of the profession, the editor asserted, were afraid that the march of preventive and state medicine would gradually put them out of business. The medical profession, advised the *Standard*, should adjust to change, rather than whine vainly against it.[71]

A number of the city's physicians joined the American Association for Labor Legislation, a liberal organization which espoused the cause of state-operated health insurance during the First World War. Henry B. Favill, the internist, was an influential member of this group.[72] Other of the city's doctors called for governmental aid to medical schools to supplement the undependable financial support which came from private sources. Arthur Dean Bevan, Chicago surgeon and Chairman of the American Medical Association's Council on Medical Education and Hospitals, saw the future of medicine as tied inextricably to constantly increasing support from the state. He warned on the eve of the First World War that medical men should recognize the inevitable trend toward federal participation in medical education, public health, and medical care for the people; doctors, he wrote, should adopt insurance schemes for the care of the less fortunate classes in society

[69] *Ibid.*, Feb. 18, 1903.
[70] Chicago Medical Society, Council Minutes, May 27, 1910.
[71] *Med. Stand.*, 1909, 32, 4-5.
[72] Chicago Medical Society, *History of medicine and surgery*, 175.

and direct them themselves. His views were summarized in the following sentences:[73]

> Medicine has become not only a function of the state, but also one of the most important functions of the state. . . . In the interest of the people we should demand adequate state support for medicine in order that medicine in return may properly perform its great function to the state and the people may benefit from the great possibilities offered by preventive medicine, intelligent medical practice and medical research.

Dr. Bevan, like many other of the city's physicians, joined the Progressive Party in 1912 in an effort to keep alive the spirit of reform. He took an active part in the political campaign of that year, as did ex-health commissioner Evans and George Kreider, editor of the *Illinois Medical Journal,* the official publication of the state medical society.[74] Dr. S. V. Clevenger, a psychiatrist who had won fame by his exposure of conditions at the County Insane Asylum in the 1880's, was a founder of the Progressive Medical League, which purported to be the medical branch of the party. Clevenger wrote a number of pamphlets during the campaign supporting the party of Roosevelt and condemning both old parties as "bought by Big Business Interests." He related his struggle for non-political treatment of the insane to the aspirations of the Progressive Party, whose creators, he assured his readers, were "vastly more honest and intelligent than old party demagogues, who fill positions in public hospitals and insane asylums with cruel, brawling incompetents."[75]

In the realm of medical politics, the impact of this reform era was equally sharp. On the local, state, and national levels of medical organization, individuals and groups arose to protest abuses of democracy in their professional societies. The Chicago Medical Society, as a result of strong protests against the concentration of power in the hands of a few specialists, was decentralized into branch groups in 1903. A strong fight developed between those who wished to abolish all multiple voting for council members by specialists belonging to constituencies in both branch and specialty organizations, and the defenders of the *status quo.* Former health commissioner Evans led the insurgents here as he did physicians within the Progressive Party. In 1910 victory came to the Evans faction and representation of specialty societies on the council of

[73] Bevan, Arthur D. "Medicine a function of the state," *J. Amer. med. Ass.,* 1914, *62,* 821-823.

[74] *Illinois med. J.,* 1912, *22,* 729-730.

[75] Clevenger, S. V. "Physicians and the progressive party," *Dr. Clevenger's Comments,* 1912, No. 1, 1-8, Collected Papers, Crerar Library.

the Chicago Medical Society was discontinued. During this first decade of the century, politics played an increasingly important rôle in the Society's activities; definite parties became discernible, political platforms were drawn up, and great controversy centered around the appointment and duties of the election commission. There was, moreover, a great deal of bickering on points of order and constitutional changes, reflecting the national penchant for "constitution-tinkering."[76]

The American Medical Association, whose headquarters were in Chicago, also felt the pressure for reform. A number of undemocratic features in the constitution and practice of the Association were severely censured by individual members and constituent societies. Criticism was directed particularly at the practice of assigning several executive positions to the same person; the lack of provision in the Association's journal for free discussion of policies and methods was also scored; and some Chicago doctors, in the best tradition of Progressivism, called for a system of initiative and referendum to make the organization more responsible to its members. The Chicago Medical Society at one point adopted a resolution, later rescinded, condemning the absence of democracy in the management of the Association.[77] Several of the city's medical journals joined the Society in the attack. The *Medical Standard,* for example, accused the "bureaucracy" at the helm of the Association of seeking to destroy the nation's independent medical press through deprecating journals which relied on the advertising of proprietary remedies for their support.[78] By 1909 the *Standard* was criticizing the whole structure of the American Medical Association. The entire organization, it was charged, was controlled by a small group of powerful trustees, who were only nominally elected by the house of delegates. The rank and file were completely without voice in the transactions, policies, and deliberations of the Association; "the pyramid," the editor accused, "hangs by its apex instead of resting on its base." What was most needed, according to the *Standard,* was some constitutional provision for a direct channel of communication between the members and the executive departments. There must be an opportunity for delegates to deliberate on important questions of policy, instead of rubber-stamping the decisions of the officers; what passed for debates in the

[76] Chicago Medical Society, Minutes, 1903-1910, *passim.*

[77] Chicago Medical Society, Minutes, Jan. 11, Feb. 8, 1910.

[78] *Med. Stand.,* 1906, *29,* 1-2.

annual conventions were in reality only "prayer and mutual admiration speeches."[79]

Soon after the armistice of 1918, however, the movement to democratize medical societies, along with the other political and social reforms with which physicians had busied themselves, began to fail in interest. From the peak of idealism to which Woodrow Wilson had led them, Americans now plunged to a new low of pessimism and disillusionment. The national mood changed from one of concern over social and political justice at home and abroad to one of indifference to social problems in America and rejection of American commitments in Europe. The revelation of the secret treaties, the cynicism of the Paris negotiators, and the uproar over communist successes in Russia and Eastern Europe, all combined to create a climate of despair and distrust in the United States. Everything European became suspect, whether it was French literature, the Weimar Republic, or social welfare legislation. All Europeans were scheming and designing, ready to despoil innocent and beguiled Americans; the nation retreated into a new isolation motivated by suspicion of foreigners and a defensive adulation of American institutions. One positive factor in the national outlook following World War I was the widespread confidence in business and business techniques. The American economic system was heralded as incomparably superior to anything the Old World had been able to produce; the difference, some people began to suggest, was that business in the United States was not saddled with all sorts of restrictive laws governing employment, compensation, and social insurance. The decade following the return of peace to the United States, in summary, was characterized by an anti-social individualism, an opposition to reforms, reformers, and foreign ideas, and a glorification of American business.

Chicago's medical press reflected faithfully this change in the national temperament. A number of medical journals became quickly involved in the Great Red Scare of the 1920's. Articles on such subjects as "The Three Internationals," "The Red Menace," and "Random Shots at Pacifists" appeared with increasing regularity. A typical edition warned in 1923 against the combined danger of "pacifists and reds." The pacifists, declared the writer, were weakening the United States Army by their "unholy stand" against universal military training; an army was urgently needed 'for protection against the friends and co-workers of the pacifists, the 'reds,' the Soviets, the Bolsheviks, all blood-thirsty anarchists."

[79] *Ibid.*, 1909, *32*, 625-626.

The remedy for this situation, suggested the editorial, was "a dictatorship which would promptly deport to Russia all these imbecile pacifists . . . and their progeny, the conscientious objectors, and all the cursed anarchists."[80]

Other journals concerned themselves with health fads, the latest dance crazes and their effect on health, birth control, Couéism, immigration, or psychoanalysis. During most of the 1920's, Freud's theories failed to receive a scientific hearing in any of the city's journals, but were subjected instead to ridicule and derision on the editorial pages. As late as 1933, the *Illinois Medical Journal* unleashed a savage attack on psychoanalysis to prevent its being taught in American colleges. Typically, a heavy weapon in the *Journal's* assault was the fact that psychoanalysis had been "imported" from Europe; American psychiatrists, the editor boasted, would never hand out such "pabulum." Freud's work was characterized by the editorial as "pseudo-analysis" and "sexo-analysis," while Freud's world was declared to be "an open sewer and men and women merely floating blobs of pestilence." The conclusion was a curious one for a scientific periodical: "In the final analysis it all reminds you of bad little boys writing dirty words upon the barn."[81]

The anti-reformism of the 1920's was also clearly visible in the writings of Chicago's medical men. Charles J. Whalen, editor of the *Illinois Medical Journal* throughout this period, expressed at least the official attitude of the state's physicians in his frequent attacks on reforms and reformers. Whalen's vitriolic pen assailed the curse of reform as "UPLIFTUS PUTRIFACIENS" and reformers within the profession were dismissed as "medical bolsheviks."[82] A leading editorial appeared in 1921 under the revealing banner, "Professional Reformer a PERVERT." The *Journal* at various times opposed the eight-hour-day for women, a national child labor law, workmen's compensation, free clinics, the Sheppard-Towner Act for maternal benefits, and compulsory health insurance. The reasons which Whalen advanced for opposing these measures were sometimes comfortably free of logic. The child labor amendment, for example, was opposed on the ground that "it is sponsored and supported by every red and communist in the United States."[83] Whalen also found communists and bolsheviks

[80] *Chicago med. Recorder*, 1923, *45*, 820-821.
[81] *Illinois med. J.*, 1933, *63*, 193-198.
[82] *Ibid.*, 1920, *38*, 47. Whalen complained that at "any moment, at any place, one may expect to be reformed or investigated."
[83] *Ibid.*, 1925, *47*, 88.

behind compulsory health insurance and the Sheppard-Towner Act.

As the possibility of national health insurance waned in the 1920's, Whalen's attacks on reform increased rather than decreased in acerbity. Scarcely an issue passed during 1922 and 1923 without a petulant rehearsal of the dangers of "revolution." Socialists were seen to be lurking in every corner, ready to impose socialized medicine on the unsuspecting physician. Women's clubs were viewed with particular suspicion by Whalen; they were often infiltrated, he warned, with bolshevists. All pretense of detachment vanished from the editorial columns in the course of the decade. Where he had earlier stressed the suffering of the public under government medicine, he now wrote more of the suffering doctor. All federal legislation respecting medicine was rejected as imposing on the prerogatives of the medical profession; for a number of months in 1924 the editorial page of the *Journal* was headed as follows: "DOCTOR WRITE YOUR SENATORS AND CONGRESSMEN AT ONCE OPPOSING THE SHEPPARD-TOWNER BILL NOW IN CONGRESS." Another favorite caption read "Medicine must shake off its false leadership or be bolshevized."[84] In 1932 Whalen saw the fulfillment of his prediction of ultimate bureaucracy and socialism in the use of government monies by President Hoover to stimulate business recovery. In the "stifling blanket of over-legislation . . . [and] the murderous burden of taxation" of 1932, editor Whalen felt the closeness of the end of republican government in America.[85]

Other of Chicago's medical leaders shared Whalen's keen distrust of government. William Allen Pusey, in his presidential address before the American Medical Association in 1924, also discerned a sharp trend toward socialism in the increase of governmental power. But there were certain influences, in Pusey's view, which would in time bring to a halt the march of socialism; nature could not forever be denied in her efforts to cut down the unfit, for example, and the machinery of governmental bureaucracy would eventually become so large and cumbersome that it would simply fall apart. The power of an "enlightened minority" to shape events was also a factor in the equation. Pusey believed that medical men must take their place among those followers of Spencer who refused to compromise with the uplifters on even such measures as the Sheppard-Towner Act.[86] As late as 1929, with the American

[84] *Ibid.*, 1921-1927, *passim.*
[85] *Ibid.*, 1932, *61*, 186.
[86] Pusey, W. A. "Some of the social problems of medicine," *J. Amer. med. Ass.*, 1924, *83*, 1905-1908, 1960-1964.

economy at an all-time peak of unregulated expansion, another well-known physician was arguing that the federal government was trying to dominate both labor and capital. It was government, not capitalism, which medicine had to fear; the only menace from capitalism, he suggested, came from its support of unethical foundations which operated clinics and laboratories, and supported research on socio-medical problems.[87]

Doctors, like everyone else, were absorbed in the fascinating process of making money during the 1920's. Since medical men possessed a legendary lack of acumen in financial matters, they were bombarded from every corner with advice on how to invest and speculate on the stock market. In a single issue of one medical journal in 1920, there appeared the following articles: "The Physician from the Banker's Point of View," "The Business of Medicine," "Education the Cure [for physicians' economic problems]," "The Doctor and His Money," "Therapeutic Exigencies Having an Economic Bearing," and "Economic Phases of Medicine."[88] Physicians were keenly aware of the respect accorded business and financial leaders in this era; they were advised by their own leaders and journals to pay greater heed to the business aspects of medicine, to emulate the philosophy and example of the business world. An editorial in the *Medical Standard* in 1925, for example, advised the doctor to "sell himself" to his clientele for "in the last analysis the doctor sells his services just as the merchant does his goods, and the patient buys them just as he does the merchant's goods."[89] The *Standard* would have deplored such a comparison as odious a decade earlier. Another typical article in 1929 defined medicine frankly as the "business of selling health service." The medical businessman, doctors were advised, could no more afford to await passively buyer demand than his commercial counterpart; he should encourage employers to pay their workers higher wages so that the latter might be able to buy more health services.[90]

The depression years after 1932 brought some change in the social and political thinking of Chicago's physicians, but the alterations were dictated more by expediency than conviction. Franklin Roosevelt's bold program in 1933 brought a ray of optimism and

87 Charles B. Reed, "State medicine means regimentation and nullity," *Illinois med. J.*, 1929, *56*, 248.

88 *Clinique*, 1920, *41*.

89 "The doctor must sell himself," *Med. Stand.*, 1925. *48*, 9.

90 Webb, J. Lewis. "Economic laws governing the worker's income," *Bull. Chicago med. Soc.*, 1930, *32*, 23-28.

hope into the deepening abyss of lethargy and gloom in America; his early efforts, therefore, met with the approval of the medical profession. "The Council of the Chicago Medical Society," wired the Society's secretary in March, 1933, "wish to voice their enthusiastic approval of the President in his entire economic program from first to last."[91] The Chicago Roentgen Society displayed a new attitude toward positive government in its plea in 1934 that the United States restrict the immigration of doctors because of the competition they brought to an already suffering profession.[92] Chicago's doctors were enthusiastic, too, about the medical relief program which furnished not only medical care to the unemployed, but financial salvation to many physicians. The chairman of the Chicago Medical Society's advisory committee declared in 1936 that[93]

> Your Committee believes that in this project these people have been furnished the best type of medical care that they have ever had in this State. We hope that plans may be maintained whereby each individual physician may still be privileged to render medical service to his client and to receive compensation for claim.

But many of the articulate spokesmen for the city's physicians did not conceal their continued opposition to any and all plans for using the resources of government to aid the more unfortunate persons in the community. Dr. Whalen fought every social welfare measure debated in the 1930's and the *Illinois Medical Journal* became almost a personal vehicle in his campaign. He told a group of manufacturers in 1934 that they should cease "gagging on chocolate coated communism . . . [and] discard . . . all of these 'workmen's welfare' schemes that are only socialistic and paternalistic passing of the buck from the individual to industry at large."[94] He pleaded with industry to make common cause with medicine against the common foe—socialism. In 1935 this official journal of the state's doctors professed to find communism in the Social Security Act of that year:[95]

> Finding a joker in the new Social Security Act is as easy as seeing the water in Lake Michigan. This new law is a horse laugh on scientific medicine and American patriotism. Tentacles of this octopodan law will entwine the medical profession more securely than has been managed by any other communistic traps or socialistic twiddle-dee-dees emanating from the patriotically-paralytic bureaucracy bossing the country. . . . Even the dullest

91 *Bull. Chicago med. Soc.*, 1933, *35*, 525.
92 Chicago Medical Society, Council Minutes, Oct. 9, 1934.
93 *Ibid.*, Mar. 10, 1936.
94 *Illinois med. J.*, 1934, *65*, 25-28.
95 *Ibid.*, 1935, *68*, 293.

economist discerns readily the fist of politics clutched in the cash box of appropriations. . . . Surely the scarlet stain far more than tinges that provision of the Act where the nefariously non-patriotic Children's Bureau, sponsor of the Shepherd-Towner [*sic*] and other bilge of like ilk, get a chance to manipulate still another appropriation of about seven million dollars.

Although it was scarcely possible that Whalen reflected the point of view of the average physician during the 1930's, there was little evidence to show that he did not. The membership of the Illinois State Medical Society continued to approve, tacitly if not openly, his editorship. Perhaps only men who felt as strongly as Dr. Whalen about social welfare measures took the trouble to set down their views, while other Chicago physicians lacked the courage or the interest to answer his tirades. In the council debates of the Chicago Medical Society, at any rate, a number of delegates did display strong social consciences at various times, though the arguments were usually dominated by those who were antagonistic to all welfare plans. Certainly no Bayard Holmes appeared in the 1930's to champion the cause of the underprivileged and the underfed; and there was no N. S. Davis to insist that human dignity take precedence over property rights in every debate.

Virtually all of Chicago's doctors agreed that some kind of "means test" was necessary for the admission of charity patients to hospitals and clinics. A dispute arose in 1937, however, over the method of weighing income against responsibilities in evaluating a patient's ability to pay. The committee of the Chicago Medical Society which was charged with drawing up a schedule advocated some sort of flexible yardstick of measurement because of the delicate nature of the problems involved. But when this report was laid before the whole council, considerable opposition developed because the standards had not been set fast and hard at the minimal estimates of the amount necessary to sustain life without charity. Dr. Edward Ochsner, a well-known surgeon, took the leadership in denouncing the committee's budget. The flexible standard, he charged, played "into the hands of the up-lifters and the emotionalists. In my opinion the up-lifters are a bigger handicap to humanity's progress than our gangsters and our criminals."[96] Three years earlier, Ochsner had written a book which strenuously opposed all social insurance schemes, public and private, industrial and medical. His outlook on social problems was reminiscent of the early nineteenth century liberal who saw complete economic

[96] Chicago Medical Society, Council Minutes, May 1, 1937.

freedom as the most desirable state this side of paradise; all economic and social ills he blamed on deviation from the laissez-faire policy. All forms of social insurance he characterized as "economic disease"—which was true in a sense since insurance palliated the illnesses of an unregulated capitalistic order—but for Ochsner the insurance itself was the disease, making a mockery of the rugged virtues of free enterprise. So marked was his prejudice against all measures of social amelioration that he confessed to presenting only one side of the question since "there is only one side."[97]

Summary

Looking back over a century of medical thought on social and political matters in Chicago, what may be said of the over-all pattern? In general, Chicago's medical men have been identified with the *status quo* and with the dominant political and social ideas of any given period. There has been little originality, little heterodoxy; there have been few political leaders and few reformers among them. Though always wont to remind critics of their private medical philanthropy, physicians have seldom been identified with leadership in movements for social amelioration. A doctor like Bayard Holmes is so rare as to be an anomaly. In periods of reform, doctors often supported the reformers; when liberalism was under attack, they tended to ally themselves more closely with the conservative groups in the community. In the pioneer era, Chicago doctors followed the libertarian lead of their freedom-loving neighbors; and in the wake of industrialism they aligned themselves with those who had an economic stake in society and politics. When the city felt the sting of liberal thought in the 'Progressive Era,' Chicago's doctors once again raised high the banner of reform; but when conservatism and reaction ruled the city in the 1920's, the banner was deeply buried.

With respect to participation in politics, the city's doctors have seemed to swing back and forth between two poles of thought, one regarding politics as an unprofessional and undignified activity for a physician, the other stressing the realistic necessity for medical men to organize and work together politically to achieve certain ends. During those periods when the relations between the medical profession and the city administration were reasonably good, there was little talk of politics. But when the reform spirit prevailed, when physicians were moved by accounts of political usurpa-

[97] Ochsner, Edward H. *Social insurance and economic security*. Boston, 1934, *passim*.

tion of medical functions in public institutions, then physicians organized (or spoke of organizing) to remedy the situation. In their social thought and in their politics, physicians have tended, under pressure of work and the expansion of medical knowledge, to rely increasingly on a few spokesmen to express the "medical point-of-view." Whether these leaders of opinion have accurately represented the thinking of the profession is at best an open question. The absence of any vocal criticism, however, leads one to conclude that, for all practical purposes, a small number of men form the opinions which the economic and social prepossession of the vast majority re-enforces.

William Gilbert: Plant Grafting and the Grand Analogy

JANE M. OPPENHEIMER*

IT is the present technique in intellectual history to attempt to trace the influence of an idea or of a pattern of ideas on the development of subsequent thought, and in science to assess the rôle of particular discoveries in contributing to the growth of those that succeed them. But what of the discovery made centuries before its time, forgotten for centuries if ever remembered, which had no immediate effect in stimulating further progress in an experimental program it might well have initiated, yet which in a subtle and elusive way may have colored the whole fabric of thought for its originator whose great contribution lay within a completely different spectrum? A case in point is a highly modern experiment in plant grafting performed some time before 1600 by William Gilbert.

It could be a temptation to begin in the hackneyed way by introducing Gilbert as "familiar to a modern audience" for his early work on electricity and magnetism, specifically for his analogy between the earth and a magnet,[1] an analogy at which he arrived as the outcome of a series of investigations which provided perhaps the first and certainly one of the purest examples of all time of the New Philosophy based on induction and experiment. Gilbert is probably, however, unfamiliar except to the professional historian or the professional physicist; he is certainly less well known than he deserves so far as the general informed public is concerned. To raise him to the position of eminence which the

* Department of Biology, Bryn Mawr College. Written at the Osborn Zoological Laboratory, Yale University, during the tenure of a John Simon Guggenheim Memorial Foundation Fellowship. I am grateful to the Historical Library of the Yale Medical Library for the use of its excellent collections, and to Mr. John Spurbeck of the Department of Biology, The Johns Hopkins University, for assistance in the preparation of the illustrations.

[1] Gilbert, W. *De magnete, magnetisqve corporibvs, et de magno magnete tellure; physiologia noua, plurimis & argumentis, & experimentis demonstrata.* London, Peter Short, 1600. In the present communication, page references will be given both to the *editio princeps* and to P. Fleury Mottelay's translation, *On the loadstone and magnetic bodies, and on the great magnet the earth. A new physiology, demonstrated with many arguments and experiments.* New York and London, 1893. A translation superior to this with excellent notations by Sylvanus P. Thompson was issued by the Chiswick Press for the Gilbert Club in 1900, but only 250 copies of this were printed; therefore the references are given to the more readily available translation, which is on the whole reasonably satisfactory.

perspective of history assigns him is not, however, the function of the present communication. Rather this is to describe and discuss a particular experiment performed by Gilbert which seems to have escaped the notice of some of the authors who have recently reviewed the history of their subject, namely, the demonstration of plant polarity by comparing the development of grafts inserted in original and in reversed orientation.

The description and analysis of the experiment constitute an essential part of Chapter VI, Book III of *De Magnete*. The chapter is entitled "What seems to be a contrary movement of magnetic bodies is the regular tendence of union," and in its brevity (thirty lines in the original)[2] it is worthy of being reproduced in its entirety here:

IN magnetic bodies nature ever tends to union—not merely to confluence and agglomeration, but to agreement, so that the force that causes rotation and bearing toward the poles may not be disordered, as is shown in various ways in the following example. Let *CD* be an unbroken mag-

netic body, with *C* looking toward *B*, the earth's north, *B* [*sic*] and *D* toward *A*, the earth's south. Now cut it in two in the middle, in the equator, and then *E* will tend to *A* and *F* to *B*. For, as in the whole, so in the divided stone, nature seeks to have these bodies united; hence the end *E* properly and eagerly comes together again with *F*, and the two combine, but *E* is never joined to *D* nor *F* to *C*, for, in that case, *C* would have to turn, in opposition, to nature, to *A*, the south, or *D* to *B*, the north—which were abnormal and incongruous. Separate the halves of the stone and turn *D* toward *C*: they come together nicely and combine. For *D* tends to the south, as before, and *C* to the north; *E* and *F*, which in the mine [in minera] were connate parts, are now greatly at variance, for they do not come together on account of material affinity, but take movement and tendence from the form. Hence the ends, whether they be conjoined or separate, tend in the same way, in accordance with magnetic law, toward the earth's poles in the first figure of the stone, whether broken or divided in the second figure; and *FE* of the second figure, when the two parts come together and form one body, is as perfect a magnetic mass as was *CD* when

[2] Gilbert, *op. cit.*, 1600, 130-131; 1893, 198-200.

first produced in the mine [in sua venâ genitum]; and *FE*, placed on a float, turn to the earth's poles, and conform thereto in the same way as the unbroken stone.

This agreement of the magnetic form is seen in the shapes of plants.

Let *AB* be a branch of ozier or other tree that sprouts readily; and let *A* be the upper part of the branch and *B* [*sic*] the part rootward. Divide the branch at *CD*. Now, the extremity *CD* [*sic*], if skilfully grafted again on *D*, begins to grow, just as *B* and *A*, when united, become consolidated and germinate. But if *D* be grafted in *A*, or *C* on *B*, they are at variance and grow not at all, but one of them dies because of the preposterous and unsuitable apposition, the vegetative force, which tends in a fixed direction, being now forced into a contrary one.

Gilbert's attribution of the results to the tendency of the vegetative force (*vis vegetiua*) in a fixed direction is a metaphysical interpretation; yet no more valid explanation of comparable phenomena on a physical basis has yet been proved. Granted that in some biological materials electrical forces may have their play, the modern postulate of molecular orientation[3] as the basis of polarity in the organism still remains to be verified. Our very word "polarity"[4] is borrowed from the concept of the poles of the earth to describe phenomena in the egg and the organism that we cannot yet otherwise define or explain.

Historical influence in science as in other fields is notoriously insusceptible to measurement, but the complete absence of reference to this experiment of Gilbert's by two such interesting and

[3] Harrison, R. G. "Relations of symmetry in the developing embryo." *Trans. Conn. Acad. Arts Sci.*, 1945, *36*, 277-330.

[4] R. Bloch, in his excellent review, "Polarity in Plants" (*Botanical Rev.*, 1943, *9*, 261-310), claims that the extensive use of the word *polarity* in animal embryology and plant morphology ensued upon its introduction into the literature concerning animal regeneration by G. J. Allman (in: "Report of the present state of our knowledge of the reproductive system in the Hydroidea," *Brit. Ass. Adv. Sci.*, Rept. 33d meeting in . . . 1863 [London 1864], 351-426). It may be appropriate to remind the reader that it was Allman who also introduced the use of the terms *ectoderm* and *endoderm* into the literature as names for the external and internal layers of the coelenterates.

Whether or not the word for polarity was common between 1600 and 1863, the concept was a ruling idea in biological thinking, particularly through the mediation of the German "romantic" biologists, i.e., Goethe and Oken.

interested investigators of the historical aspects of the study of plant polarity as Vöchting[5] and Bloch[4] is sufficient proof that performance of this experiment by Gilbert hardly altered the course of subsequent botanical experimentation. The question remains, however, as to how actively the execution of the experiment may have influenced Gilbert in his own thinking, and in the circumstances this is a question sufficiently impelling to warrant some further consideration.[6]

Before attempting to evaluate the significance of his experiment with reference to the development of Gilbert's thought, it may, however, first be appropriate to examine the possible influences which led him to perform it in the first place. Gilbert was by no means the first to have experimentally investigated functional polarity in plants. The planting of shoots in reverse orientation was known at least as early as the time of Theophrastus:[7]

> To return to the other trees:—in propagating them they set the cuttings upside down, as with vine-shoots. Some however say that that makes no difference, and least of all in propagating the vine; while others contend that the pomegranate thus propagated has a bushier growth and shades the fruit the better, and also that it is then less apt to shed the flower. This occurs also, they say, with the fig; when it is set upside down, it does not shed its fruit, and it makes a more accessible tree; and it does not shed its fruit, even if one breaks off the top as it begins to grow.

Pliny, while he did not specify the effect of planting cuttings in reversed orientation, warned that this was a procedure to be avoided:[8]

[5] Vöchting, H. *Ueber Organbildung im Pflanzenreich. Physiologische Untersuchungen über Wachstumsursachen und Lebenseinheiten.* Erster Theil. Bonn, 1878. Also, *Ueber Transplantation am Pflanzenkörper. Untersuchungen zur Physiologie und Pathologie.* Tübingen, 1892. Bloch, *op. cit.*

[6] It was Gilbert's custom in *De magnete* to weight his experiments, designating them with "larger and smaller asterisks according to their importance and their subtility" (*op. cit.*, 1600, ij verso; 1893, xlix). Three experiments in Chapter VI of Book III are ornamented by the author's small asterisks: the division of the magnet, its refloating after the parts are reunited with the poles in their normal orientation, and the experiment on plant grafting.

[7] Theophrastus. *Enquiry into plants and minor works on odours and weather signs.* With an English translation by Sir Arthur Hort. (Loeb Classical Library), London, 1916, I, 145 (*Enquiry into plants*, II, vi, 12). Referred to by Vöchting, 1878, *op. cit.*, 198. Vöchting also makes reference to Columella for a similar experiment, and to the warning of Palladius Rutilius, "Curandum, ne virgula inversa deponas."

[8] Pliny, *Natural history.* With an English translation . . . by H. Rackham. (Loeb Classical Library), Cambridge (Massachusetts), 1950, V, 87 (*Natural history*, XVII, xxviii, 124).

Vöchting (1878, *op. cit.*, 199) writes with reference to the passage by Theophrastus: "Auch bei Plinius findet sich eine Aufgabe, deren Inhalt im Wesentlichen mit der eben angeführten Aussage von Theophrast übereinstimmt, und die dem letztern jedenfalls entnommen ist," and refers in his footnote to the source of this as *Natural history*, "XVII. 11." I have been unable to locate such a statement by Pliny regarding reversed cuttings in Book XVII, chapter xi, or anywhere else in Book XVII, even in the particular edition of Pliny (Detlefsen, Berlin, 1866) cited by Vöchting. Possible explanation of Vöchting's error is to be found in footnote 14 below.

> We must now speak of the planting of cuttings. In this care must be taken above all that the cuttings are made from trees that bear well, that they are not bent in shape nor scabbed or forked, that they are thick enough to fill the hand and not less than a foot long, that they are planted without injury to the bark and always with the cut end and the part that was nearest the root downward.

In an earlier chapter of the same book of the *Natural History*, however, he indicated that the reversal of orientation was not limited by the ancients only to ordinary planting, but that it was extended to actual grafting:[9] "But grafts are also inserted the other way round [inversi] when the intention is for them not to grow so long but to spread out."

Whether Gilbert knew the descriptions of these experiments by Pliny and Theophrastus must remain uncertain. If he was indeed aware of them, it might be considered curious that he did not mention that his own results seemed at variance with what had previously been reported. He made no specific citations of them, but his lack of frequent direct references to the ancients, in fact to any "authorities," is one of the most modern of the characteristics of Gilbert's monograph, in contrast to many books of the sixteenth century. But occasional references to writings both by Theophrastus and Pliny on the loadstone are found in *De Magnete*, and it is more than reasonable to assume that Gilbert, who was in turn Bachelor of Arts, Fellow, Master of Arts, Mathematical Examiner, Doctor of Medicine, and finally Senior Fellow of Saint John's College at Cambridge, was thoroughly well grounded in the classics.

It is, however, probably more to the point to emphasize that an experiment comparable to Pliny's inverse orientation of grafts was reported also by a contemporary of Gilbert's, Giovanni Battista della Porta of Naples, who in 1592 described his attempt as follows:[10]

> But the method of putting the graft [furculum] upside down according to Pliny in order that the tree should not grow upward, we have found false, to be sure we tried it with vine and with plum tree but they reached the same height as the rest.

9 Pliny, *op. cit.*, V, 75 (*Natural history*, XVII, xxiv, 106). Vöchting (1892, *op. cit.*, 58) refers to this correctly so far as book and chapter are concerned, but in the text of the same page he erroneously describes the experiment as one involving planting, not grafting: "Wie im historischen Abschnitt bemerkt, setzte man schon im Altertum Reiser in verkehrter Richtung zu dem Zweck ein, dass die Bäume mehr in die Breite als in die Höhe wüchsen."

10 Porta, G. B. della. *Libri XII* in quibus . . . plantarum cultus . . . et . . . ad frugum, vini ad fructuum multiplicationem experimenta . . . exhibentur. Frankfurt, 1592, 215 (L. IV, c. xxiv): "Sed modum inuersum furculum ferendi à Plinio appositum, ne arbor in altû excrescat, nos falsum reperimus, quippe in vite, & pruno experti, ad reliquarum altitudinem peruenerunt."

Whether Gilbert knew this experiment, or even this particular publication of Porta's, there is no way to be certain. Though this passage, like those of Theophrastus and Pliny, was not cited, it is not impossible that Porta's failure to confirm the classical writers may have first attracted Gilbert to his new repetition of the experiment.

Porta wrote also, however, on the properties of the magnet, and this Gilbert knew very well; there are, in fact, more references to the work of Porta in *De Magnete* than there are to any other author. The work of the Neapolitan which Gilbert cited was the second edition of *Magiae Naturalis*,[11] a treatise which touched on subjects ranging from distillation and "statick" and "pneumatick" experiments through magnetism, the generation of animals, horticulture and tempering steel to invisible writing, counterfeiting gold and beautifying women; it was of course particularly the discussions on the loadstone that Gilbert took up in *De Magnete*:[12]

> Very recently Baptista Porta, a philosopher of no ordinary note, makes the 7th book of his *Magia Naturalis* [*sic*] a very storehouse and repertory of magnetic wonders; but he knows little about the movements of the loadstone, and has never seen much of them; much of what he has learned about its obvious properties, either from Messer Paolo, the Venetian, or through his own studies, is not very accurately noted and observed; the book is full of most erroneous experiments, as will appear in fitting place; still I hold him worthy of praise for that he essayed so great a task (even as he has essayed many another task, and successfully too, and with no inconsiderable results), and that he has given occasion for further researches.

[11] Porta, G. B. della. *Magiae naturalis libri XX*. Naples, 1589; the first edition, in four books only, published in Naples in 1558, was written when the author was very young, only fifteen years old according to his own testimony which has, however, been questioned as to accuracy.

[12] Gilbert, *op. cit.*, 1600, 6; 1893, 11. "Messer Paolo, the Venetian," incorrectly indexed by Mottelay as Marco Polo, who had been mentioned in a previous chapter, is in reality Fra Paolo Sarpi. Porta acknowledged his debt to Fra Paolo Sarpi in the Proem to his Book VII: "I knew at Venice R. M. Paulus, the Venetian, that was busied in the same study . . . from whom I not onely confess, that I gained something, but I glory in it, because of all the men I ever saw, I never knew any man more learned, or more ingenious, having obtained the whole body of learning; and is not onely the Splendor and Ornament of Venice or Italy, but of the whole world" (*Natural magick . . . in twenty books*. London, 1658, 190. This is an anonymous translation of the second edition.).

Fra Paolo knew the work of Gilbert and both he and Porta corresponded with Gilbert and discussed him in correspondence with others. Fra Paolo considered Gilbert one of the two independent thinkers of his times: "Non hò veduto in questo secolo huomo, quale habbia scritto cosa sua propria, salvo Vieta in Francia & Gilberti i Inghilterra" (*Lettere Italiane di Fra Paolo Sarpi . . .*, Verona, 1673, 29-30). Gilbert is supposed to have visited Fra Paolo in Venice; the problem of the relationships between them has been considerably discussed, but has been highly disputed and is still controversial. For a well-documented treatment of the relationships between Porta, Gilbert, and Sarpi, which are not everywhere so critically evaluated, see the excellent discussion by Park Benjamin, *The intellectual rise in electricity, a history*, London, 1895, 224-344. Benjamin discusses only the problems of electricity and magnetism, not plant grafting; Sarpi is said, however, to have been an excellent botanist and it may be permissible at least to wonder about his possible connection with the plant grafting experiment.

The fact that Gilbert knew Porta's work on the loadstone hardly represents assurance that he knew Porta's experiment on the reversed orientation of plant grafts. This latter experiment is not discussed by Porta in the second edition of *Magiae Naturalis* which we know by the numbering of the books to be the one read by Gilbert; indeed, in setting down in this volume his rules for grafting, Porta, though echoing Pliny in many other respects, does not even repeat Pliny's warning for cuttings that they had best be set right side up:[13]

> But now, as we did in our tract of the commixtion of divers kinds of living Creatures; so here also it is meet to prescribe certain rules, whereby we may cause those divers plants which we would intermingle, to join more easily, and to agree better together, for the producing of new and compounded fruits. First therefore, we must see that either of the Trees have their bark of one and the same nature: and both of them must have the same time of growing and shooting out of their sprigs; as was required of living creatures, that both of them should have the same time of breeding their young ones: for if the graffe have a hard or a dry bark, and the stock have a moist or soft bark, or that they be any way contrary to each other, we shall labour in vain. Then we must see that the ingraffing be made in the purest and soundest piece of the stock, so that it neither have any tumors or knobs, or any scars, neither yet hath been blasted. Again, it is very material, that the young graffes or shoots be fetcht from the most convenient place or part of the Trees; namely, from those boughs that grow toward the East, where the Sun is wont to rise in the Summer-time.[14] Again, they must be of a fruitful kind, and be taken off from young plants, such as never bare fruit before. They must also be taken in their prime, when they are beginning first to bud, and such as are of two years growth, and likely to bear fruit in their second year. And the stocks into which they are to be engraffed, must likewise be as young as may be graffed into; for if they be old, their hardnesse will scarce give any entertainment to strange

[13] Porta, 1658, *op. cit.*, 63.

[14] The orientation of plants with reference to the cardinal points of the earth was an important concern for the ancients; see for instance Pliny, *Natural history*, *op. cit.*, V, 59 (XVII, xvi, 83-84): "The same authority [Cato] would not have omitted, if it were important, to recommend making a mark in the bark on the south side, so that when trees were transplanted they might be set in the same directions as regards the seasons as those to which they were accustomed, to prevent their north sides from being split if set facing the midday sun and their south sides from being nipped if facing the north wind. Some people also follow the contrary plan in the case of a vine or a fig, replanting them turned the other way round, from the view that this makes them grow thicker foliage and afford better shelter to their fruit and be less liable to lose it, and that a fig-tree so treated also becomes strong enough to be climbed." This, too, represents in a sense an experiment in plant polarity!

Can it be possible that this is the passage that Vöchting (see footnote 8 above) considered as adapted from Theophrastus and that he made the mistake of referring to it as XVII.11 instead of XVII.16? The editor of the Loeb edition of Theophrastus, in connection with a word from the passage from Theophrastus in question, gives a cross reference to this passage of Pliny, which might put him of the same mind as Vöchting. The wording of the second sentence of this Pliny passage, *out of its context*, might permit of this interpretation: "quod e diverso adfectant etiam quidam in vite ficoque, permutantes in contrariam; densiores enim folio ita fieri magisque protegere fructum et minus amittere, ficumque sic etiam scansilem fiere," but the context itself would certainly seem to suggest otherwise and to indicate that *in contrariam* refers to north and south rather than to rootward and skyward.

shoots to be planted upon them. And many such observations must be diligently looked into, as we have shewed in our book of Husbandry.

But if the question must remain open as to whether Gilbert knew of Porta's 1592 publication in addition to the *Magiae Naturalis,* and hence as to whether he was cognizant of Porta's botanical experiment before he performed his own, there is a more interesting point that bears discussion, namely, what such knowledge might have contributed to him had his mind actually been exposed to it. This is a question that is answerable in a sense so far as the loadstone, if not the willow branch, is concerned. In the case of the loadstone, their analyses of their data can be contrasted, and from the difference between their interpretations a clue may be derived to elucidate the qualities of Gilbert's own intellectual power, and the clue is one which interestingly enough points back to the willow experiment as representative of something fundamentally central in his thinking.

Gilbert's great contribution was the inference from the behaviour of a spherical loadstone that the earth is a magnet. Porta, like Gilbert (and indeed like Peregrinus before them both), knew the spherical loadstone:[15]

Let the Loadstone be turned round, by the wheel of the Jewellers, and polished. Then make a slender iron, as long as the axeltre of that round ball, and lay that upon the stone: for it will turn it self upon that line, that points just north and south. Mark the line upon the stone, with some delible paint: do the same on the other-side of the stone; and where it rests upon the ball, draw the same line: do the same the third and fourth time, upon the middle of it: and where those lines cross one the other and meet, those are the polar points. We may also find it out thus: Break a small needle, and put the smallest piece upon the same ball, and stir it; for when it comes to the just northern point, the needle will stand upright, that will make standers by admire, and will stand perpendicularly upon it: and till it do rise thus, be not weary of moving it up or down; for when you have found it, you will be glad of it.

Where lay the difference between Porta's exposition of the experiment and Gilbert's? Here may rest the explanation of their minds' likeness or unlikeness. Porta had no interpretation; he turned away at the end to a frivolity, "that will make standers by admire," and this was characteristic of his thinking. Gilbert drew from his little sphere the grand analogy; he considered the little sphere a little earth, the great earth like the small one a magnet; and by so doing, he established one of the fundamental truths on which all science has subsequently builded.

15 Porta, 1658, *op. cit.*, 207.

But the foundation for Gilbert's analogy lay deeper than a superficial resemblance in form or in action between a spherical earth and a spherical loadstone. Sphericity, like opposition, in itself could present no challenge to one so steeped as was Gilbert in Aristotelian physics and metaphysics. His analogy between earth and loadstone was intimately related in his own mind to what he considered to be an identity of the earth with a living organism, and here is the significance of the experiment with the willow. As he fitted the small and the large earth into a single scheme, he fitted them both into the same pattern with the willow, and on the same experimental basis.

Analogy is a knife that cuts two ways, and Gilbert trimmed both edges sharp. He argued his analogy not only from loadstone to plant, but also in the reverse direction from organism to earth:[16]

> Therefore Aristotle is partly in the right when he says that the exhalation which condenses in the earth's veins is the prime matter of metals: for exhalations are condensed in situations less warm than the place of their origin, and owing to the structure of lands and mountains, they are in due time condensed, as it were, in wombs, and changed into metals. But they do not of themselves alone constitute the veins of ore; only they flow into and coalesce with solider matter and form metals. When, therefore, this concreted matter has settled in more temperate cavities, in these moderately warm places it takes shape, just as in the warm uterus the seed or the embryo grows. . . . But that there is gold, or silver, or copper, or that any other metals exist, does not happen from any *quantitas* or proportion of matter nor by any specific virtues of matter, as the chemists fondly imagine; but it happens when, earth cavities and the conformation of the ground concurring with the fit matter, those metals take from universal nature the forms by which they are perfected, just as in the case of all other minerals, all plants and all animals.

It is not without significance that his own designation for his new philosophy, *physiologia,* has remained our term for the study of living function. The word was first used in our modern sense, according to Sherrington, by Jean Fernel in 1542; he used it again twelve years later as a title for the seven books constituting Part I of his *Medicina.* Jacob Sylvius used it in Paris in 1555; "A. M." used it in 1597 in an English translation of Guillemeau's *Surgery.*[17] Again a question arises which, again, remains incompletely answered, this time as to whether Gilbert knew the work of Fernel. There is a single reference to him in *De Magnete,* "Fernel, in his book *De Abditis Rerum Causis,* says that in the loadstone is a

[16] Gilbert, *op. cit.,* 1600, 20; 1893, 35-36.

[17] Sir Charles Sherrington, *The endeavour of Jean Fernel, with a list of the editions of his writings.* Cambridge (England), 1946.

hidden and abstruse cause."[18] If Gilbert knew by 1600 this rather mystical volume, first published in 1544, it would seem most probable that as a physician he knew either the 1542 *De Naturali Parte Medicinae* in which the word first appeared in its present usage, or the re-issue of this volume in 1554, entitled *Physiologia,* forming part of the more inclusive *Medicina.* By 1600 the latter had appeared in over a dozen editions, some of which contained both the *Physiologia* and the *De Abditis Rerum Causis* between the same covers. Fernel was not so obscure a figure in his own age as he seems in ours; Gilbert was a cosmopolitan rather than a provincial figure in a cosmopolitan intellectual world. Gilbert's expansion of Fernel's term from its narrower to a wider cosmic sense offers further evidence of his preoccupation with the community of living and non-living matter in a unified universe.

But if Gilbert's obligations to Fernel, as those to Theophrastus and Pliny and Porta, can only be surmised, the greatest of his debts to the past he betrays by the whole fibre of his thought, namely, that to Aristotle, who in all actuality dominated the science of what is so often misrepresented as an anti-Aristotelian age. Gilbert's talk of opposition and contraries, of agreement, above all of *form* (the ends of the magnet "take movement and tendence from the form," remember he said, and "the metals take from universal nature the forms by which they are perfected")—this is what is old, not new, in *De Magnete,* and it grew, like so much of the Renaissance, out of Aristotle. Without Aristotle for background, Gilbert's thought would be unintelligible; in the light of Greek thought, the Elizabethan reflects lucidity—this was the glow of the times.

Harvey focuses it, too—he who left the vital spirits in the blood, unawakened to the meaning of his own discovery that the heart can be conceived of as a machine. Harvey, as a matter of fact, is in many ways a counterpart of Gilbert as an innovator in the new philosophy; out of the Aristotelian in his thought he, too, developed the method of induction and experiment. Harvey does not stand alone as herald of the new biology, nor Gilbert as the prophet of the new physics—together as intellectual companions they create the new world. It is no mere coincidence that Harvey and Gilbert both began as medical practitioners; the very conservatism of medical lore may have been what preserved for them a knowledge of Aristotle in humours, in coctions, in opposites. It

[18] Gilbert, *op. cit.,* 1600, 4; 1893, 8.

kept it for them, furthermore, not only in dry, scholastic doctrine but in an armamentarium of living, working knowledge that they carried to the side of every patient. And in transmitting to them what was traditional in the physician's knowledge, it brought to them also, in spite of itself, Aristotle's idea of form dynamic as part of matter—an idea which made his biological concepts as alive and dynamic as the Renaissance was to prove them to be. Harvey abstracted from this heritage the concept of dynamism, Gilbert that of form; it was the analogy between the underlying "forms" of the mineral and vegetable kingdoms that Gilbert believed he demonstrated in his experiments with plant grafting.

Nature, animate and inanimate, for Gilbert the physician was one, and it was only out of the depth of this conviction that he could work his comparison between the earth and the magnet. "The magnetic force is animate, or imitates a soul," he wrote for the title to Chapter XII, Book V; "in many respects it surpasses the human soul while that is united to an organic body,"[19] and the chapter begins:[20] "Wonderful is the loadstone shown in many experiments to be, and, as it were, animate. And this one eminent property is the same which the ancients held to be a soul in the heavens, in the globes, and in the stars, in sun and moon."

The whole chapter continues as an elaboration on this theme, and it concludes:[21] "Wherefore, not without reason, Thales, as Aristotle reports in his book *De Anima,* declares the loadstone to be animate, a part of the ultimate mother earth and her beloved offspring."

If an interesting and important experiment that has apparently been forgotten by posterity has borne no direct impact on the later performance of comparable experiments, it may yet have exerted an indirect effect on the minds of all who have worked in science since 1600. It was the only experiment on living material that Gilbert either reported or performed to fortify his analogy between the living and the non-living. His great contribution to science was to bring the old relationships between microcosm and macrocosm open to the new experimental method which he initiated, and by his single experiment on the willow he accomplished just this. He may have argued or speculated about metals and embryos, but he experimented with the graft in inverse orientation. "Let whosoever would make the same experiments," he

[19] Gilbert, *op. cit.*, 1600, 208; 1893, 308.
[20] *Loc. cit.*
[21] Gilbert, *op. cit.*, 1600, 210; 1893, 312.

wrote of his whole programme in the Author's Preface to *De Magnete,* "handle the bodies carefully, skilfully and deftly, not heedlessly and bunglingly; when an experiment fails, let him not in ignorance condemn our discoveries, for there is naught in these Books that has not been investigated and again and again done and repeated under our eyes."[22]

Whether or not his analogy between the animate and the inanimate was valid is for the moment irrelevant. It was fruitful, in that it lay at the heart of his interest, and was thus bound up with the development of an investigation whose outcome has led not only to the dominant material characteristics of our present civilization, but also to the foundation of all of our subsequent scientific conceptions. For whether we concede to the universe, to the earth, to the magnet, or the organism a soul, we cannot escape the necessity of invoking, as involved in all the known phenomena of animate or inanimate nature, electrical forces of one sort or another, and it was Gilbert who introduced these as inevitable material for experiment.

22 Gilbert, *op. cit.,* 1600, ij verso; 1893, xlix.

FIG. 1. Photograph of Codronchius from a painting in the Museum at Imola. (Taken from Capparoni.)

The 'De Morbo Novo, Prolapsu Scilicet Mucronatae Cartilaginis, Libellus' of Baptista Codronchius

MICHAEL BURMAN AND ANITA H. LOVE*

INTRODUCTION: A SHORT HISTORY OF XIPHOID INJURY**

PROLAPSE of the xiphoid had long been recognized by the common people to follow a blow to the cartilage, but many physicians refused to recognize such a luxation. The peasants of the South of France, who believed this lesion not infrequent, named the xiphoid the 'brechet' (bird breast), the 'palette,' or the 'crochet' (hook), for it may be divided at its apex, or broadened, or directed outward. More often the xiphoid appendix has been called the mucronate or ensiform cartilage, for it looks like a sword or the point of a sword. The lay people, so Codronchius affirmed, called the lesion also the 'anima caduta' (fallen kernel), for the 'anima' is the nut of a fruit which has a middle position like that of the xiphoid.

A beginning in the modern history of investigation of the xiphoid was made by Paré, although speculations on its function and its ability to press on the underlying liver, stomach, and diaphragm were made by others before him. Their opinions are reported by Codronchius and, later, by Septalius and will not be repeated here.

> It is commonly believed that this cartilage slips from its place, but it is so well joined to the sternum that it cannot do so. Steeped, however, in an excess of humors which often swim about the superior orifice of the stomach, this cartilage can be relaxed and softened so that it may be said to slip and separate from the sternum. It can be redressed as much by the hand as by astringent and drying things applied externally or taken internally.

After Paré came Codronchius, who first reported posterior prolapse of the xiphoid. This prolapse followed a blow to the part or the accumulation of humors thereabout, and its concomitant symptoms resulted from direct pressure on the underlying viscera. He listed three methods of cure, of which the most pertinent is direct manipulation of the xiphoid. He made the interesting obser-

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vation, supported by the authority of Aristotle and Pliny, that a resected xiphoid is never reconstituted; but he does not give experimental or surgical data to support his statement, which clinically is true. Reference to the works of these men revealed no clue to their opinions on the subject.

Baptista Codronchius (Fig. 1) was born on 27 August 1547, in Imola, the son of Alessandro and Camilla Codronchi.[1] He was graduated from the University of Bologna in Arts and Medicine on 24 October 1572, and returned to his native town to practise medicine. He was active in public life, having been elected to the City Council at the age of twenty-four, later serving as health officer or municipal physician, and becoming 'vessilifero ed ufficiale della spesa' in 1591. Poor health forced him to retire in 1592 from public life; thereafter, he devoted himself to writing until his death of 'intercurrent fever' 21 February 1628. His personal life seems to have been unhappy. Eleven of his fourteen children died early in life. Tommasso, his only son, who embraced his father's profession of medicine, died when he was only twenty-four. His wife died in 1618.

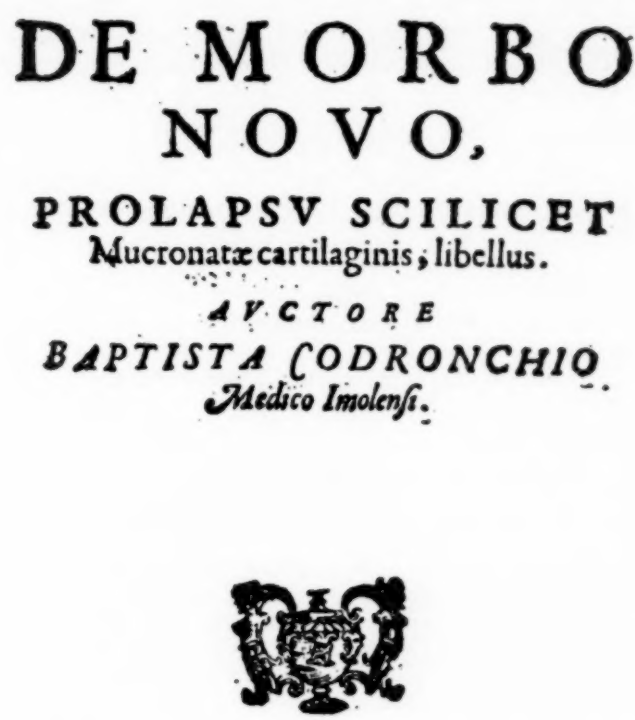
Codronchius' medical works covered the fields of hydrotherapy, pharmacology, hygiene, and legal medicine, and in the latter field he was a pioneer. His six published works gained him a wide Continental reputation, guaranteeing him a place among eminent European, and especially Italian, physicians. Thorndike has commented on one of the works, *De morbis veneficis ac veneficiis* (The Illnesses of Witches and Witchcraft), published at Venice in 1595. This book was written out of Codronchius' concern for the many people, including his own daughter, in Imola and other Italian towns who were held to be bewitched. He wrote also on defects of the voice (*De vitiis vocis,* Frankfurt, 1597) and on rabies (*De rabie,* Frankfurt, 1610).

He was a friend of many of the illustrious doctors of the day, especially Girolamo Mercuriale of Forli, and Nicola Masini. It was Masini's encouragement that induced Codronchius to write the treatise here translated. It forms part of a longer work published at Bologna in 1603 entitled *De morbis, qui Imolae et alibi communiter hoc anno MDCII vagati sunt, commentariolum, in quo potissimum de lumbricis tractatur, et de morbo novo prolapsu*

[1] This Italian form has been abandoned herein in favor of the Latin spelling which is used in Codronchius' publications.

scilicet mucronatae cartilaginis libellus.[2] The treatise begins on page 43 with a separate title-page (Fig. 2).

Borrichius (1680) described the posterior prolapse of the xiphoid in three cases independently of Codronchius, with whose work he does not seem to have been acquainted. He mentions the



DE MORBO
NOVO,
PROLAPSV SCILICET
Mucronatæ cartilaginis, libellus.
AVCTORE
BAPTISTA CODRONCHIO
Medico Imolenſi.

BONONIAE,

Apud Ioannem Baptiſtam Bellagambam. 1603.
Superiorum permiſſu.

Ad inſtanza di Simon Parlaſca, Libraro
ſotto le Scuole.

FIG. 2. Reproduction of the title-page of Codronchius' work.

2 'A commentary on the diseases commonly met with at Imola and elsewhere, concerning itself especially with intestinal worms, and a treatise of a new disease, to wit, the prolapse of the mucronate cartilage.'

case of the obese Catherine Walther who, as she became fatter, languished and finally died, presumably of the maintained effects of luxation. In 1688, Seger, a Polish surgeon, reported the congenital separation of the xiphoid in a male infant subject to hiccoughs. He apparently believed in the maternal impression of injury, for the mother, four months before the child was born, was thrown from a carriage to the ground, dislocating her right shoulder. The xiphoid was joined firmly to the sternum when the child was a year old. The case is dubious for there has been none like it since.

Delamotte in 1712 had a patient who in her eleventh pregnancy suffered from a cruel vomiting for two months as a consequence of posterior incurvation of the xiphoid:

> I sat her on her bed, head drawn to her knees. Slowly, I insinuated my fingers under the xiphoid cartilage and pulled its inwardly directed point outward, which by its inturning had irritated the stomach constantly, provoking ceaseless vomiting and some pain. She was thereby cured and vomited no more during the rest of her pregnancy. She was happily delivered when her time came.

Martin, a physician of Lausanne, reported in 1737 an often quoted case of posterior inturning of the xiphoid:

> It seems that M. Martin is fruitful in the use of simple remedies and it is hoped that his example and success will make this practice more universal. He had under his care a man, eighteen years old, subject to frequent spells of vomiting because he had received a blow to the region of the xiphoid cartilage which had thrust it in. All remedies had proved useless until finally M. Martin decided to manipulate the cartilage and to replace it by a movement with two fingers of his right hand which manoeuvre provoked a little cracking sound. He was not acquainted with the Book of Codronchius, "De Prolapsu Cartilaginis Mucronatae." Although the possibility of this prolapse is still doubted, the observation of M. Martin favors it.

The first self-manual reduction of the posteriorly inturned xiphoid was described by Bird in 1838. A sawyer had vomited so frequently for three years that he became emaciated.

> Examination showed an exceedingly elongated ensiform cartilage, which, bending inwards, pressed upon the neighboring parts. When the patient placed his fingers under the displaced organ and elevated it, he was enabled to prevent the vomiting. In a week afterward, it was ascertained to be as nearly as possible broken off. Since this had occurred, the medicines which before were of no benefit, had now a decidedly good effect; the occurrence of the vomiting was less frequent and the patient was altogether improved.

Gruner in 1786 sponsored the candidacy of John Bernard Schnobel for the degree of Doctor of Medicine at the University

of Jena. Schnobel defended the thesis of Codronchius, editing his text, and checking and annotating his references. Gruner in footnotes commented on phases of his experience with xiphoidal luxation.

De Sauvages (1786) refers to a dissertation of Heister, *De luxatione cartilaginis xiphoideæ,* which is not included in the 'Surgery' by the same author because it had been separately printed. He regretted that he could not procure it. The present author has had no better luck. Dr. Walter Plöbst of the University Library in Munich reported on 5 July 1952 that the volume was not to be found there. It seems to be a phantom work. Heister in his textbook makes this statement on the authority of Codronchius: "Imgleichen wird die Cartilago xyphoides oder ensiformis am Brustbeins von einem Falle oder Stosse zuweilen einwarts gedruckt, welches oft schwere und gefährliche Zufälle an der Leber und Magen verursacht."[3] Other contemporary writers, such as Borsieri and Tourtelle, mention xiphoidal luxation as a cause of persistent vomiting. Yet Billard comments on the fact there were some who denied the existence of the lesion. Such was Boyer who said: "The xiphoidal appendix of the sternum can not be displaced backward. A blow delivered with violence to the pit of the stomach can in truth thrust it back: but cartilaginous and elastic, it rebounds when this cause has ceased to act."

The first open reduction of the xiphoid was done by Billard in 1805. An apprentice seaman, eighteen years old, fell from a vessel of the Republic, the *Foudrayant,* to the bench of a lifeboat. He became so greatly enfeebled by persistent vomiting in thirty days he seemed about to die. After consultation with four of his colleagues of the Council of Naval Health at Brest, Billard decided that an heroic procedure was necessary. This was done on 25 September 1804 without anaesthesia. Billard passed a blunt and flat hook of his design under the xiphoid and lifted the posteriorly displaced xiphoid forward. At the very moment of reduction, the patient cried out that he felt relief such as he had never had since his fall. The wound healed by secondary intention and the lad was hale again a month later.

Linoli (1852) was the first to resect the distal half of the posteriorly incurved xiphoid, an operation done in the patient's

[3] In the English translation of the book, the passage is given thus: "Sometimes it happens that the Ensiform Cartilage, at the bottom of the Sternum, is depressed or thrust inward by some Violence, so as to greatly afflict the Stomach."

home without anaesthesia. The young man, twenty-two years old, had been tormented for many years by an obstinate cardialgia and more recently by persistent vomiting. A diagnosis of congenital retroflexion of the xiphoid was made by careful examination of the epigastrium.[4] A significant operative finding was the observation of pressure of the retroflexed xiphoid on the full stomach. He could not, however, observe the true state of the stomach because of arterial hemorrhage.[5] During the operation, the man maintained a rare fortitude. To quote Linoli, he opened his mouth only to speak these words: "Please give me this piece of bone which has so long tortured me. I want to keep it near me so long as I live. I feel well and thank you."

Rinonapoli (1888) resected the entire xiphoid in a peasant upon whom a donkey fell while he held on to its tail in climbing a hill. The backwardly luxated xiphoid was removed extraperitoneally, the wound healing by secondary intention. The operation of xiphoidectomy is still rarely done and not more than twenty-five cases have been reported. The largest series, eleven or twelve cases, is held by Narat (1922) who resected this bone for the vague entity he called xiphoiditis.

Duchez in 1865 reported three cases of posterior inclination of the xiphoid in his doctoral thesis at Montpellier. A lift against resistance, awkwardly done, throws the patient forward. The body is thrown backward suddenly to avoid a dangerous fall. It is this movement which rends the epigastrium and tears the xiphoid away. He reduced the xiphoid manually in full expiration, for the process is then easily felt. The abdomen and lower part of the thorax were bound tightly after the reduction. I myself had found only an anterior inclination of the xiphoid in the avulsion form of luxation until finally, on 28 May 1952, I saw two examples of the Duchez type of luxation caused by hyperextension force. I quote Duchez' Observation III:

> In October 1862, I was asked to give first aid to a patient whose condition, I was told, was very alarming.
>
> Louise B., 28 years old, of good constitution but of a very nervous temperament, wanted to lift a heavy sack of wheat to her shoulder. She could not put it there on two different tries. Gathering all her forces together,

[4] Note this specific anatomical diagnosis rather than the vaguer diagnoses of posterior prolapse made by earlier authors.

[5] It is still moot whether the xiphoid actually presses upon a nether viscus, although Linoli stated that in three autopsies he had seen a retroflexed xiphoid which indented the liver in one case and ulcerated the stomach at the point of contact in the other two.

she then made a third effort, raised the sack, and suddenly fell backward. At that moment, she felt a tearing in the epigastrium and so great a pain that she fell in a faint. She was found in this state some time later and regained her senses by sprinkling of cold water. She was helped up and returned to her home. She was fatigued. Breathing was difficult and she had a little pain in the epigastrium. The desire to vomit came on very quickly.

I saw the patient about six hours after the accident. I found her lying down, her face pale and her features expressing suffering. Vomiting persisted and with each contraction of her stomach, a small amount of mucous bile was ejected, but only after very strong and painful contractions. Respiration was short, difficult, and interrupted by hiccoughs. Pain was very sharp on pressure. The pulse seemed normal. The patient was able to tell me how her accident happened and what she felt.

The violence of the symptoms made me fear a more serious lesion, which was fortunately absent and once the luxation was reduced, all of these disturbing symptoms disappeared little by little. She was put on her left side, with her trunk bent forward, the position which was least painful. By palpation, I found the appendix thrust in for its entire length. The base had lost all its connection with the sternum. My finger found the tip of the sternal plate to be perfectly free. The xiphoid was movable and could be pushed in strongly. But it did not hold this position and went back as soon as the pressure ceased. I proceeded to the reduction. The very open thorax, the scantiness of the fatty tissue, the length and consistency of the cartilage, allowed reduction with great ease. I applied a body bandage, advised cold and slightly acid drinks, and a light and scanty diet. A fortnight later, the patient came to thank me for my care. She was completely recovered. The appendix had its normal direction and could no longer be pushed in.

The contrary lesion, the anterior luxation of the xiphoid, is much more often seen than the posterior luxation. This would not seem to be so from the literature which concerns itself largely with the more dramatic posterior prolapse. Septalius, Royal Protophysician of Milan, described the anterior luxation of the xiphoid in 1632. Apparently a politician as well as a physician, Septalius dedicated his work to Trotto, President of the Senate, beseeching help in his controversy with the barbers who were flouting the power vested in Septalius as Protophysician.

Gallez in 1876 told the story of a coke worker who struck his epigastrium against the edges of a cylinder, one-half centimeter thick. A small tumor the size of a large almond made the epigastrium prominent. Gallez brought the xiphoid into line with the sternum with a certain force, a dry sound being heard.

In Burman and Sinberg's textbook, four forms of luxation are described, the anterior inclination form, the posterior inclination form, the retroplacement form, and the avulsion of the xiphoid. A distinction should be made between the luxation of the xiphoid

at its joint with the sternum and its anteflexion or retroflexion, or a bend in the body of the xiphoid itself. This distinction is not always made in the cases reported.

Anatomy of the Xiphoid and the Importance of its Variations

The xiphoid, which has inconstant shape, is a fairly constant structure, significantly absent sometimes in hereditary syphilis. It may be long enough to reach the navel (Desault), hindering flexion of the trunk. Whether Desault quotes the same case as Vesling (1598-1649) I do not know, since my references to this anomaly are indirect.[6]

The studies of the older anatomists are given by Codronchius. Significant recent anatomical studies have been made by Philippe (1902) and by the English anatomist, Paterson (1904). Amatus of Portugal described perforation of the xiphoid in the third century A.D. Such perforation of the xiphoid is not uncommon, for Zimmer (1939) found its incidence to be 20 per cent. Preperitoneal fat has twice herniated through the opening. In Walther's case (1905), a railroad man of forty-seven was struck in his epigastrium by the handle of a feather duster as he fell. The xiphoid broke though the hole. Fritsch (1911) described an epigastric hernia, the proximal extension of which herniated through the xiphoidal orifice.

Another anatomical variation is the bifurcated xiphoid which ordinarily gives no disability. In the case of Zadek (1941), the prongs of the bifurcated or tack hammer xiphoid caught the recti, causing epigastric pain and catching of food in the pit of the stomach.

After forty years of age, the body of the xiphoid ossifies and the joint between the sternum and the xiphoid is often fused. The tip of the process may remain cartilaginous even to advanced age. Fracture of the xiphoidal body occurs mainly in the later years of life. Clarus (1810) discovered the first example of xiphoidal fracture in a man, sixty years old, who struck his epigastrium against the sharp edge of a grain measure. This fracture was only an in-

[6] Later, when I did have the opportunity to examine Vesling's *Syntagma anatomicum*, it became apparent that an error had been perpetuated. The pertinent part of the compound sentence, "Nonnumquam digiti longitudine ad umbilicum usque producta" means that "sometimes, it [the xiphoid] is continued even for the length of a finger towards the umbilicus." The phrase does not state that the xiphoid actually reached the navel. Reference to Desault's *Surgical works* and *Treatise on fractures, luxations*, etc. was futile in an attempt to establish the fact that Desault himself had seen a preternaturally long, navel-encroaching xiphoid.

cidental finding in the exploration of the region of the liver. A unique fracture of the xiphoid by chronic cough was given by Dunlap and Ivins (1952) in a woman of thirty-six. The proximal fragment, fixed to the lower and posterior end of the sternum, was excised. She was well two months later. Note that Codronchius mentioned the luxation of the xiphoid by coughing.

This short history of the injury of the xiphoid aims to place the work of Codronchius in proper perspective. His monograph is a bibliographical rarity. Miss Lucille M. Morsch, Chief of the General Reference and Bibliography Division of the Library of Congress wrote me on 22 May 1951: "The publication about which you inquire is neither in the collections of the Library of Congress nor the Army Medical Library. We have been unable to find it listed in the National Union Catalog, the *British Museum Catalogue,* the *Catalogue Général* of the Bibliothèque National, De Ricci's *Census of Medieval Manuscripts in the United States and Canada,* or Kelly's *Encyclopedia of Medical Sources,* though we find entries for other books by Giovanni Battista Codronchi." The translation was made from a photostatic copy of the original work sent to me by Dr. Raffaele Flaminio Dondi of Cesena, Italy, whose kindness and courtesy I gratefully acknowledge.

Codronchius' monograph has never been published in translation in any language, although Dondi summarized it. The following translation, which is the joint effort of Mrs. Love and myself, tries to keep to the spirit of the original text but not to its very letter. Certain sentences are omitted as not important to the continuity of his thought. The translation began collaterally to the work on *Injury of the Xiphoid.* The preparation of a complete bibliography introduced me to Codronchius. His work proved so fascinating that we went exhaustively into this early and still neglected field. It is contemplated to publish the early history of the xiphoid in book form, reproducing the original text and including commentary with the translation. Many of these publications were found with difficulty, some in the New York Academy of Medicine Library and others in the Armed Forces Medical Library. We are grateful for their co-operation.

I should like to commend the keen mind and fine qualities of my colleague, Mrs. Love, the widow of a surgeon, who was graduated from Vassar College in 1897 and is now in her eightieth year.

Translation

Chapter I. That New Diseases are Possible is Proven

[*p. 45*] It seems to me both useful and satisfying to investigate a new illness, unknown to ancient or contemporary physicians. It is not by temerity that I dare to attempt this thing with which I shall acquaint you. Nothing has been recorded on this subject to this very day, even though many learned men have concerned themselves with it. Reason does not deny that new illnesses, never before seen, often arise. Plutarch (Book 8, Prob. 9), Cornelius Celsus, and Avicenna attest to this. Celsus, in the preface to his books, stated that thinking physicians invariably excel empiricists, for they often encounter new illnesses which had not been discovered by so-called experience.

[*p. 46*] Avicenna stated that the existence of certain diseases should not be denied because they were not seen at a given time or in a given place. Such illnesses may not be ordinarily detected. This is not contradicted by logic. There are things which from the very beginning of the world have seemed perfect but are nevertheless imperfect. It follows that new effects must arise from new causes. New illnesses may arise by two causes, a depraved way of life and an altered condition of the air. This is affirmed by history and the authority of eminent men. I shall not consider the supernatural causes of new illnesses discussed so fully by D. Basilius and the holy theologians, nor those illnesses attributed by astrologers to certain conjunctions of the stars. Plato in Book 3 of The Republic stated that in the time of Aesculapius there were neither catarrhs nor states of flatulence. Pliny (Book 26, Chapter 1 of his Natural History) wrote that there crept into Italy in the mid-reign of Tiberius Claudius Caesar a lichen disease called 'mentagra,'[7] an illness apparently unknown to past generations. Elephantiasis was not seen in Italy before the time of the great Pompey. The carbuncle was first discovered in the Censorship of Lucius Paulus and Quintus Martius. In Book 25, Chapter 3, he further stated that certain diseases of the mouth arose by the drinking of water from a spring in Germany, as well as a lameness. The teeth fell out, and the knee joints were relaxed. This illness was hitherto unknown. Plutarch stated that rabies was a new disease in the time of Aesculapius. This contagious disease was unknown to Aristotle and even to Hippocrates. I have amplified this in my as yet unpublished book "On Rabies."[8]

[*p. 47*] Galen in his book on the various immoderations of the body and in Book 2 of the different fevers (Chapter 2, which discusses causes and symptoms) tried to show that rigor without fever was a new and strange affection unknown to Hippocrates. Nevertheless, I saw this in Laura, the wife of Paulus Lanius in November of 1599. She had been greatly plagued,

[7] *I.e.*, sycosis.

[8] This book was later published at Frankfort in 1610 with the title *De rabie, hydrophobiae communiter dicta. Liber duo. De sale absynthnii libellus. De iis quae aqua immerguntur opusculum, et de ellebore commentarius.*

often at night, for three or four days. After the failure of many remedies, she was restored to health by white hellebore. Galen (in Books 1 and 6, On the Locations of Illnesses, Chapter 3) noted that certain little animals, called Dracunculi (guinea worms), were found in the legs of men in a certain part of Arabia. Yet he himself had never seen this illness. Later Avicenna saw this illness (Tracts 3 and 4, Chapter 21) and called it the 'vena medeni.'[9] Galen had never seen seven- and nine-day fevers (his first Commentary on Epidemics, 3 text 2) and he denied their existence, even though Avicenna and other very experienced observers of this time had seen such fevers. Variola and measles and the deadly spots called petechiae by us were unknown to the ancients. The Gallic pestilence is a new disease which was unrecognized for a long time. It arose in the year 1494 when Charles VIII, King of the French, occupied the Kingdom of Naples during the Papacy of Alexander VI. Many men, especially Petrus Forestius, proved that scurvy, which raged in the ships of the Hollanders or Batavians and the West Frisians, was a new illness. There ran wide through almost all of Poland a new malady, the Polish plait[10] or the morbus cirrorum (the disease of ringleted hair). This malady, unknown to other times, was excellently revealed by that renowned Saxon, Hercules. Others tell us in the year 1549 [*p. 48*] there arose far and wide in Panonia[11] vipers and lizards which, lodging in human bodies, killed thousands of people every day. They suffered greatly and were unrelieved by any art or remedy, for these vipers could not be destroyed or expelled.

Chapter II. The Reason Why this Work was Undertaken and the Names of the New Disease Revealed

The prolapse of the mucronate cartilage was generally known in past years. Some men and women professed the power to cure this prolapse. Certain trustworthy men had told me that they themselves had suffered grievously from this illness and were made well by the help of others. Yet I was unwilling to put my faith in them, for this previously undescribed illness was held by contemporary physicians to be nothing more than nonsense or an old wives' tale. I suspected something of deception, superstition, or magic to underlie all this, indeed a scheme to extort money from these wretched men. But later I learned of some patients who were cured and restored to health. Nicola Masini, physician of Cesena, stated that this illness did exist and could be cured. It is not inconceivable that a new and hitherto unknown illness may be found. Galen (Methods of Medicine, Book 14, Chapter 1 and 7) had often encountered many things not previ-

[9] We have been unable to find the meaning of 'vena medeni.'

[10] The 'plica Pocotiense lues' is the Polish plait or plica Polonica, an end stage of pediculosis capitis in which the hair is matted and twisted. The disease was endemic in Poland and other parts of eastern Europe. A German dictionary described 'Pokutsien' as a district in eastern Galicia.

[11] Panonia was a Roman province in western Hungary, northern Yugoslavia, and eastern Roumania, bounded on the north and the east by the Danube River.

ously known. I was thus compelled to be cautious and to adhere to a more reasonable opinion.

[*p. 49*] Because God has given me a great talent, I shall strive always to labor for the general good, and above all in those fields which others have left unexplored. I therefore resolved to write this short commentary in which I shall try to discuss ten things—first, the nomenclature of this disease; second, the primary site of affliction; third, the use of the part affected; fourth, whether this part can be bent or depressed; fifth, the discussion of the parts secondarily affected; sixth, the symptoms and the signs of the primary affection; seventh, the classification of this illness; eighth, the causes of the illness; ninth and last, the prognosis and the cure.

The first thing. The common people call this illness the 'anima' or kernel or the falling of the little bone or of the forked prop, in the mother tongue, the 'anima caduta.' I, however, have named it the prolapse, the procidentia, the depression, the bending and the flexion of the mucronate cartilage or xiphoid. Mercuriale in a letter to me rejected these prior appellations. Ignorant men have called the affected part the 'anima' as if there were a certain seat of the 'anima' which falls. Not only does the 'anima' fall but at the same time it is returned to its proper place. This is an absurd fiction. But people have foolishly believed these absurdities and have thus named the part the 'anima' in the belief that the 'anima' is taken from the body. This is said to be revealed by the shortness of breath and the gravity of the illness excited when the process slips and presses on the [*p. 50*] nether parts. Rather, they put the name of 'anima' to this centrally placed part of the body, middle placed as the nuts of fruits. Be that as it may, let us not concern ourselves with the name. I name this affection the prolapse of the mucronate cartilage.

Chapter III. The Sternum and the Mucronate Cartilage

The second thing. Galen and other anatomists stated that the breast bone which the Greeks called the sternum stabilized the ribs which encircle the thorax. Whether this bone is composed of seven parts, as the author of the 'Introduction' thought, or of twelve as Galen (*De anatomicis administrationibus,* Book 8, Chapter 1) asserted, or of three as Vesalius (*De humani corporis fabrica,* Book 1, Chapter 19) said, or of four as Columbus and Piccolominus postulated, or of eight bones in childhood which later are reduced to six, then four, then three, and in manhood to two and finally to one in the years of maturity as Faloppius said in his *Anatomical Observations,* I leave to the anatomists themselves to decide. A long, triangular cartilage, sometimes split and twinned, arises from the most inferior part of this bone. It seems as sharp as the point of a sword. It has many names. The Greeks called it the xiphoid in that it bore the likeness of a sword; so asserted Galen (*De usu partium,* Book 7). Others called it the mucronate cartilage for it is like the point of a sword, or a little shield, or a little sword. It was also called the "malum punicum" in its likeness to a pome-

granate. Some called it the epiglottis by its likeness to the operculum of the larynx. We may think of it as a sword or not. Yet it seems better to look at it as a kind of Spanish dagger. For the first part of the bone corresponds to the round part of the dagger, which, held with apprehension by the little finger, is vulgarly called the 'apple' of the sword. The second part of the bone, like to that part which is encircled by the whole hand, may be called the haft of the bone. The third part of the bone, together with its cartilage, looks like the rest of the dagger, and therefore some name this the xiphoid from its resemblance to a sword. Amatus Lusitanus (in his *Curationum medicinalium centuriae septem,* Centuria III, Curatio 93) reported that in the dissection of bodies he had sometimes found that cartilage naturally perforated, an observation passed over in silence by other anatomists.

Chapter IV. The Function of the Mucronate Cartilage and its Prolapse

[*p.* 52] There is no part of man which does not have some use. For otherwise it would be superfluous and were rather cast away; so Galen states in his *De usu partium,* Book 17, Chapter 1. Let us then ask the use of this cartilage. Galen (*De usu partium,* Book 6, Chapter 3, and Book 7, Chapter 21) stated that this cartilage protected the stomach and that part of the diaphragm which inserts on it. In like manner it shields the heart. Realdo Columbo (*De re anatomica,* Book 1, Chapter 21) refuted this idea since this part is quite distant from the left side of the stomach. He himself believed that this member was begotten to cover the heart and to protect the diaphragm. Johannes Valverde (*Anatomica,* Book 1, Chapter 16) held still another opinion, that it shielded the anterior part of the liver and the stomach. An eminent and learned anatomist of our day believed that the xiphoid only overlay the liver and was quite distant from the superior os of the stomach. Vesalius wrote that this cartilage protected the underlying parts but did not state which parts lay below it. What is one to think when there is so great a difference of opinion?

I am unable to see why this cartilage may not be displaced and its position changed. For however rigid it may be [*p.* 53] and joined to other parts, it is nevertheless pliant in comparison with bones so that it can be bent and change its position, albeit with some difficulty as Columbo noted. Just as the cartilaginous epiglottis is curved and bent when food and drink are swallowed and passed to the stomach, so this bone which has like nature and substance does not resist bending or depression. Nay rather, it was the opinion of Nicolaus [Falcutius] (*Sermones Septem medicinales*) and of Piccolominus that this cartilage was made by God to shield the stomach which, when distended with food, pushed the liver forward and upward. The xiphoid is both flexible and movable. Flaminius Rota, a doctor of Bologna and skilled in the discipline of anatomy, concluded that this cartilage could not be displaced but accepted its inferior depression as a luxation. Why waste time in proving a thing which is obvious? Each one of

us, who is practised in the palpation of the hypochondrium, can feel the depression of this cartilage easily. Having now disposed of the fourth point, I proceed to the fifth.

Chapter V. The Parts Affected in this Illness and the Verity of this Illness Explained

[*p. 54*] I do not know if this cartilage, like bone, induces pain when affected. Galen said (*De constitutione artis medicae,* Chapter 8) that it is without feeling (Galen, *ibidem,* and *De elementis,* Book 1, Chapter 2 and *De usu partium,* Book 16, Chapter 2). This illness is the cause of certain evil symptoms, the expression of force applied by this cartilage to the three underlying parts of the body, namely, the stomach, the liver, and the diaphragm (or even the heart, the middle part of the diaphragm or the mouth of the stomach). Some agree with Realdo Columbo that the stomach, at least its upper part, cannot be injured by the mucronate cartilage from which it is far distant. But I, disquieted, reply that we can look at the stomach in two ways, either as a part of the dead body, or as a part of the living body. Looked at in the first way, these experienced men speak the truth; in the second way, they are fooled. Parts deprived of life shrink, especially those parts which in the living are accustomed to swell. This, in particular, is seen in the bodies of men, dead after a long illness or who, after enduring a thousand [*p. 55*] torments and hardships in prisons, succumb to a violent death. It is not remarkable if their stomachs, when then seen by anatomists, lie very distant from the mucronate cartilage. In the living, a food-distended stomach approaches the mucronate cartilage. Wherefore, it was rightly written that this cartilage was made to defend the stomach for it yields to the movement of the stomach swollen by an abundance of food.

The symptoms, by pressure of this cartilage on the stomach, do not yield to any class of remedies but are forthwith abolished by its replacement. Who can therefore deny that the procidentia of this cartilage is the cause of these symptoms? We ought not to believe this malady a fiction, an invention to extort money through lack of our experience or the cupidity of others, but rather should we set ourselves against their inexperience and greed. This has happened and still can happen, that there are those who from villainy or inexperience have handled this part violently, some even when there was no need of it. When they were not sick, they were made sick; and when they were truly ill, their illness was made worse, even if the illness arose from another cause. [*p. 56*] (Fig. 3.) This insensitive cartilage cannot be visited with pain. It is the diaphragm or the liver or the mouth of the stomach which are affected, various symptoms following when those parts, joined to the cartilage or near to it, receive a force. I fail to see why these various symptoms cannot follow some external cause or equally some internal hurt to this part.

Chapter VI. The Symptoms and Signs of the New Disease

The symptoms which follow the prolapse of this cartilage are many. The ingested food, especially if it is hard and poorly chewed, reaches the

tis manifestum existimo. Nam, si hæc cartilago, cùm sit sensus expers, dolore affici non potest; & ea malè ab istis tractata, vel ob vicinitatem iecoris, vel diaphragmatis aut diaphragma, aut iecur, vel etiam os ventriculi, consensus ratione afficitur; & varia subsequuntur symptomata; cum ea fieri non possint, nisi partes eę vim huic cartilagini factæ recipiant, & illi vicinæ sint; videre non possum cur ab aliqua externa causa, vel interna allata huic parti læsione, ac vi pariter earumdem partium symptomata varia non subsequantur.

Noui morbi Symptomata, ac signa.
CAP. VI.

SYMPTOMATA verò, quæ sequuntur prolapsum huius cartilaginis, plura sunt; primùm enim vbi cibus receptus, præsertim durioris substantiæ, & non admodum dentibus fractus ad os ventriculi peruenit, obpressionem cartilaginis angustius factum, aliquantem dolorem parit, & ægrè ad ventriculum pertransit; sæpiusq; euomi consueuit, virtus enim expultrix, percipiens læsionem cartilaginis vitiatæ insurgit, vt noxiũ expellat; in quo conatu frequenter alimentũ ipsum reijcit, deinde laborantes pondus quoddam, & sæpe dolorem circà ventriculi regionem pertũplunt; potissimùm post assumptũm cibum, præcedente cum appetẽtia oris ventriculi propria functio ex Gal. 2. aphor. comm. 20. & 1. de vic. rat. in acut. comm. 18. si hæc pars à cartilagine mucronata præmatur, ac lædatur, fit

FIG. 3. Reproduction of page 56 of Codronchius' work.

mouth of the stomach where it provokes pain on account of the pressure of the narrow cartilage. The food passes with difficulty into the stomach. Often the food is vomited by an expulsive virtue which, perceiving the lesion of the cartilage, rises in irritation against it to expel the noxious substance. Food itself is frequently rejected. The sufferers feel a certain

weight and often pain in the region of the stomach, especially after eating. Since the appetite is the proper function of the mouth of the stomach (Hippocrates, Aph. 2, comm. 20 [Galen] and *De victus ratione in morbis acutis,* comm. 18), the appetite itself is threatened or even abolished if this part is pressed upon and injured by the mucronate cartilage.

[*p. 57*] When this cartilage is inclined backward, the irritation of the diaphragm by force makes breathing difficult from which patients suffer mightily when they are moved or climb to higher places such as stairs or mountains. The diaphragm can also be pressed upon by the stomach, the liver, or even the spleen to make breathing difficult. These symptoms, not observed by Galen or anyone else, may arise by pressure of the mucronate cartilage. When this cartilage presses on the liver, the bile, unable to be diffused throughout the body by reason of this compression and coarctation, brings on jaundice. The patients are repeatedly sick if vomiting and jaundice are long continued. They fall into an atrophy or a cachexia by deprivation of food and faulty alimentation. Besides the aforementioned evils, if the sufferers from this illness raise their arms up or lie supine in bed, they are afflicted by pain about the precordium. They are uneasy and restless and cannot sleep. Not all the symptoms recounted are found in each and every case, but all in all, the symptoms are sometimes more intense, sometimes less intense, by the greater or lesser depression of the cartilage created by the injury.

Chapter VII. The Nature of the Illness and its Causes

[*p. 58*] This disease, about to be examined, will be classified amongst the diseases of faulty position by bad constitution or the diseases of distortion in shape of a part. Though this flattened cartilage changes its shape and position, yet the difference in the picture of the illness is seen rather to lie in the adjacent parts affected. The cartilage itself does not suffer from disease of its substance, but its substance can be affected when it is washed by a frigid or humid juice, which is the antecedent or mediate cause of the depression. When it is so affected, it can be moved from its place by the most trifling force brought to it. I am persuaded that this illness does not follow its solution of continuity, for when this part is hard, its unity cannot be broken except with great difficulty. It is a substance intermediate to bones and ligaments, as much softer than bone as it is harder then ligament. It cannot be broken for its very flexibility makes it yield at every point. It does not resist as bones do, but when it is relaxed, it imparts a minimal injury to the underlying parts. The causes of prolapse or depression of this cartilage are either obscure or manifest. The manifest causes are extrinsic, a fall, a blow, a violence, a violent and untoward stretching of the body, a twist or a crookedness, an excessive bending of the whole body, an inordinate turning, or even, as some claim, a burdensome great cough.

[*p. 59*] The obscure causes have intrinsic origin, humors which are thin, or tenacious and thick, fetched about the cartilage, and which loosen

it so that it may be depressed by the slightest thing, much as the vertebrae of the spine are easily loosened by flooding distillations.

Chapter VIII. The Prognosis and Cure

The mucronate cartilage, like other cartilages, when it is cut out, does not grow again and, if broken, is not repaired (Aristotle, *De historia animalium,* Book 3, Chapter 8, and *De partibus animalium,* Book 2, Chapter 9, and Pliny, *Historia naturalis,* Book 11, Chapter 37). Women are wont to suffer more from this illness than men for in them the cartilage is less firm and by their nature they are more humid, abounding in frigid discharge. When this cartilage is first depressed, it can easily be restored to its proper place. If, however, the depression is neglected and continues thus for a long time, it can be reduced to its position only with the greatest difficulty because of the hardness of the part. Therefore, it is worthwhile to lift the cartilage to its natural site as soon as possible to effect a prompt cure. If there is present an abundance of humors in the body, or if the humors flow to the affected part, a plenitude of humors ought to be removed or at least lessened before the manipulation is done and the flooding of the humors checked.

[*p. 60*] The skilled operator binds the lower belly with a bandage which presses it upward. He compresses each hypochondrium with his hands beneath the ribs. The impulse imparted to the swollen parts leads the cartilage back to its proper place. This method of cure should not be used in pregnant women for miscarriage is easily brought on. This happened to the pregnant wife of a certain groom. She suffered from a fever, like a tertian fever, and with it had stomach disturbances. After someone had bound her belly tightly to restore the cartilage to its proper place, she aborted on the second day and on the following day she died. I was summoned that I might help this woman, hastened to her destruction. I was told of the boldness and clumsiness of this man. I saw the expelled dead fetus and this butchered woman. I could not but detest his insane rashness which so distressed me. I meditated if it were true that this cartilage could be prolapsed downward. And if it fell forward in this manner, what symptoms and evils would it call forth. And finally, what the cure of such a procidentia would be. I later learned that there are many forms of prolapse, one form of which I have already described. A second way of reduction which the patient himself can achieve by his own diligence is this. He lifts something heavy, as much as he is able to bear, and brings it from the ground above the summit of his head. As he holds it thus aloft with the [*p. 61*] greatest force, he turns himself to the right and then to the left. If everyone, especially women, cannot achieve this by reason of their weakness, a third method of cure may be used. The operator, feeling the displaced cartilage gently with his hands, lifts and brings it back to its natural seat. Women are more skilled in this reduction than men, the reason being, so said the most excellent Masini (who found only one of a great number of

doctors who admitted the existence of this illness), that women are more frequently taken by this disease. Women commit themselves more willingly into the hands of women than of men because of their modesty and virtue. Hence, it comes to pass that such women are more skilled because of greater practice and exercise, for they do this the more.

If the cartilage cannot be restored to its natural position by these three methods which I have set forth, perhaps it will not be without profit to place a cupping glass, opened above, over the epigastrium. Light a flame within it, for its suction has the remarkable property of drawing things up. This property is utilized in this method of reduction, for it lifts this prolapsed part up. The cup clings for a moderately long time and is removed not by force but it falls away by reason of the hole within it. Before the operator undertakes the restoration of the cartilage, he is wont to smear the whole region of the stomach with butter or with butter and oil of sweet almonds since the cartilage is hard. To this some add a little saffron. I approve of this, the more so when the prolapse is occasioned by some external cause rather than by an internal cause. In this latter event we act by drying rather than by moistening the part. This gives entrance to the hand the more easily. The tissues (the skin, the muscles, and the peritoneum) overlying this cartilage are relaxed and yield to the palpating hand. I do not disapprove if this method is sparingly used. But if the prolapse is old and made hard by callus over a space of time, those things should be applied which soften and loosen. The part is warmed deeply with a decoction of mallow and fenugreek, applied either with a sponge or a soft instrument. The cartilage having been replaced, the indication arises of making it firm and strong lest it prolapse again. That it may stay in its place constantly and firmly, a thing easily achieved, the part is kept warm with a sponge or any like thing soaked in a slightly sour dark wine in which there are mastic, frankincense, wormwood, pomegranate, red roses, cypress nuts, all brought to boil. Later, the following wax may be used.

℞

Mastic	℥ij
Laudanum	℥j
Root of Bistort Nut of Cypress Marrow of the interior of frankincense Red roses Pomegranates	an ℥ß
Red coral	ʒi

Mix with ship pitch and terebinth in sufficient amount to make a wax which for six to eight days adheres to the part. I do not commend those who use the white of an egg instead of the wax since it grows cool too quickly. Cold should be avoided in this part.

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Seventeenth Century Ophthalmology as Gleaned from Works of Nicholas Culpeper Physician-Astrologer (1616-1653)

BURTON CHANCE*

"THE Eyes of Man are great, and endued with great dignity and excellent splendor. They are a Workmanship created by the Great *Jehovah* to be the Organs of sight. They are seated in the superior part of the body, that they may be the scouts, keepers or speculators thereof."

Thus wrote Nicholas Culpeper, Gent., Student in Chyrurgery, in his little eight-page treatise, *The Eyes Anatomized,* published in 1685. Culpeper, an astrologer in high repute in the East End of London, was also a physician. The scion of a well-known family, he was born in London on St. Luke's day, 18 October 1616. He entered Cambridge at eighteen, but did not continue there long. Having a working knowledge of Greek and Latin, from the beginning of his medical studies he avidly imbibed the writings of the old medical authors and was well versed in the classical authors. By 1640 he was established as a physician and astrologer in Red Lion Street, Spitalfields.

In 1649 Culpeper astonished and infuriated the medical profession by issuing an English translation of the College of Physicians' *Pharmacopoeia Londinensis* under the title, *A Physical Directory or a Translation of the London Dispensatory Made by the Colledge of Physicians in London.* This unauthorized translation was regarded as an infringement on the rights of the College when it was realized that all the authentic formularies could be obtained in simple English. Culpeper was a prolific writer, though by no means all of his writings were published in his lifetime. His wife wrote, shortly after his death, that he "left seventy-nine books of his own making or translating in my hands." In an earlier paper I have written of Culpeper's life and publications in general terms.[1] In considering now the subject of seventeenth century ophthalmology as it appears in the published writings of this con-

* Philadelphia, Pennsylvania.

1 "Nicholas Culpeper, Gent: student in physick and astrologie." *Ann. med. Hist.,* 1931, *3,* 394-403.

troversial astrologer-physician, I have drawn upon two of the most famous of the works bearing his name: the *Pharmacopoeia Londinensis: or the London Dispensatory* in the edition of 1653 published in 1649 under the title, *A Physical Directory,* and *Culpeper's Last Legacy* (London, 1685). In spite of the widow's claim that the latter was spurious, I concur in the general opinion that it is as genuine as any of the works published in Culpeper's lifetime.[2]

The last tract in the 1685 edition of Culpeper's *Last Legacy* is that entitled "The Eyes Anatomized," a quotation from which was used to introduce this paper. Pathological anatomy, at least so far as the eye is concerned, figures not at all in Culpeper's writings that I have been able to discover; and indeed, in view of the general tenor of his life and works, it would be rather surprising if it had. It is hardly less surprising to find this little treatise devoted to the anatomy of the eye.

In the *Dispensatory* we find accounts of treatment of diseases of the eye on the scientific level of the day, reflected in the College of Physicians' *Pharmacopoeia* (as interpreted and annotated by Culpeper), and the *Last Legacy,* frankly prescribing at the folk level. The division in the seventeenth century was, of course, not always discernible.

The following quotations are from the *Last Legacy:*

"For to give a true judgment of a disease, you must consider the complexion of the party, the region that he lives in, the time of the year, the state of the air, and the diet he hath used." [*LLa,* p. 29]

"Yet this must be taken in by the way, that it is one thing to strengthen the Eyes, and another thing to take away the matter that offends them." [*LLa,* p. 180]

Included in Culpeper's version of the *Dispensatory* is a work which he calls "A Key to Galen's Method of Physick." The following passage from it, headed "Of Medicines apropriated to the Eyes," is useful as illustration of the principles supposedly underlying the *Dispensatory*-Culpeper treatment of diseases of the eye:

Take such Medicines as are apropriated to the Eyes under the name of [*Ocular Medicines*] I do it partly to avoid multiplicity of words, and partly to instruct my Country Men in the Terms of Art belonging to Physick, (I would have called them [*Ophthalmicks*] had not the word been troublesom to the reading, much more to the understanding of a Country man)

[2] References to this edition of the *Last legacy* require knowledge that the various tracts it comprises are divided into two separately paginated groups. *LLa* will refer to the first, *LLb* to the second, of these. The *Dispensatory* will be referred to as *Dispens.* The greater number of the quotations from the *Last legacy* are found in *Select medicinal aphorisms* which comprises pages 203-242 of this book and has its own separate title-page.

CULPEPER'S LAST LEGACY:

Left and Bequeathed to his Deareſt WIFE for the PUBLICK GOOD.

BEING

The Choiceſt and moſt profitable of thoſe Secrets Which while he lived were lock'd up in his Breaſt, and reſolved never to be publiſhed till after his Death

CONTAINING

Sundry Admirable Experiences in ſeveral Sciences, more eſpecially in *CHYRURGERY* and *PHYSICK*:

VIZ.

Compounding of *Medicines.* { Making of *Waters, Syrups, Oyls, Electuaries, Conſerves, Salts, Pills, Purges* and *Trochiſchs.*

With two particular Treatiſes the one of *Fevers*, the other of *Peſtilence*: As alſo rare and Choice *Aphoriſms* and *Receipts*, fittted to the underſtanding of the meaneſt Capacities.

With an Addition of two hundred *Choice Receipts*, lately found, never publiſhed before in any of his other Works; and a Compleat Table.

The *Sixth Impreſſion*; whereunto is added *An exact and perfect Treatiſe of Anatomy* of the *Reins* and *Bladder*, *Brain* and *Nerves* of all the parts of the Body, never publiſhed before this year, 1685.

By *NICHOLAS CULPEPER*, Gent. Student in Aſtrology and Phyſick.

LONDON,

Printed for *Obadiah Blagrave* at the *Black Bear* in S. *Paul's* Church-Yard, near the Little North Door. 1685.

Fig. 1. Title-page of Culpeper's *Last Legacy* at the end of which appears *The Eyes Anatomized.*

SELECT MEDICINAL

APHORISMS

AND

RECEIPTS

For moſt Diſeaſes our Frail Natures are incident to, whilſt we are upon Earth.

DIGESTED

In ſuch a Method, that a Remedy is prefixed for any Diſeaſe appertaining to Mans Body: Beginning at the Head, and going through every part of the Body to the Feet.

PART V.

COLLECTED
By *NICHOLAS CULPEPER*,
Student in Aſtrology and Phyſick.

LONDON,

Printed in the Year 1684.

Fig. 2. Title-page of *Select Medicinal Aphorisms and Receipts*, one of the several treatises in the *Last Legacy*.

as I even now called such Medicines [*Cephalicks*] as were apropriated to the Brain.

Ocular medicines are two fold, *viz.* such as are referred to the Visive Vertues, and such as are referred to the Eyes themselves.

Such as strengthen the Visive Vertue or the Optick Nerves which convey it to the Eyes (say Doctors) do it by an hidden Vertue, into the reason of which no man can dive, unless they should fetch it from the Similitude of the substance; And yet they say a Goats Liver conduceth much to make one see in the night, and they give this Reason, Because Goats see as well in the night as in the day. Yet is there no affinity in temperature nor substance between the Liver and the Eyes; However Astrologers know wel enough that all Herbs, Plants, &c. That are under the Dominion of either Sun or Moon, and apropriated to the Head, be they hot or cold they strengthen the Visive Vertue, as Eyebright which is hot, *Lunaria* or Moonwort which is cold.

As for what appertains to the constitution of the Eyes themselves seeing they are exact in sence, they will not indure the least inconvenience, therefore such Medicines as are outwardly applied to them (for such Medicines as strengthen the visive Vertues are all given inwardly) let them neither hurt by their hardness nor gnawing quality, nor be so tough that they should stick to them, Therefore let Ocular Medicines be neither in Pouders nor Ointments, because Oyl it self is offensive to the Eyes, and how pleasing Pouders are to them you may perceive your self by but going into the dust.

The *Dispensatory* itself consists of two parts: "A Catalogue of the Simples Conducing to the Dispensatory," and "A Catalogue of Simples in the New Dispensatory." The first divides the simples into the following categories: Roots; Barks; Herbs and their Leaves; Things Bred of Plants; Living Creatures; Excrements; Belonging to the Sea; Metals, Minerals, and Stones, and others of less importance. The second catalogue adds to these: Simple Distilled Waters; Spirits and Compound Distilled Waters; Tinctures; Physical Wines; Ointments and Plasters.

A comparison between the eye diseases and their remedies set forth in the *Dispensatory* and those of the *Last Legacy* should help to establish the common manifestations of eye disease in seventeenth century England, insofar as the lack of pathological description and unscientific nomenclature permits and to illustrate to some extent the therapeutic means employed at the time (probably in greater degree than might be supposed) by both the regular physician and such a practitioner as Nicholas Culpeper. The comparison shows at once a remarkable but not unexpected similarity in pathological conditions prescribed for in the two books. By reducing to a single concept, where possible, Culpeper's various ways of saying the same thing, one may deduce that the seventeenth century ophthalmologist was concerned with weak eyes that needed strengthening (*LL* and *Dispens.*); with rheum

and inflammations (*LL* and *Dispens.*); with the pin and web (*LL* and *Dispens.*); with restoration of sight, general (*LL* and *Dispens.*); and through such causes as smallpox and stroke (LL); with skin grown over the eye (*LL* and *Dispens.*); with eyes that were swollen, bloodshot, blasted, cold, or sore from heat (*LL*); with eyes that needed clearing (*LL* and *Dispens.*). It will be seen that the *Last Legacy* makes the larger contribution to this pathology.

We shall now see how these conditions were prescribed for in the two books:

For weak Eyes.

Eye-bright is an herb of ☉, and is a wonderful strengthner of the Eyes used any way, either outwardly or inwardly, both the leaves, stalks and flowers, for it is an herb appropriated to them. [*LLa*,[3] p. 261]

To clear the Eyes wonderfully.

Put two or three of the seeds of *Oculus Christi* into the Eye, and within a while after you shall not feel them, whereby you will think they are not there, at last they will drop out of themselves, compassed about with slimy filth, which hinders the sight: If you use this now and then, it will clear your Eyes wonderfully. [p. 269]

To clear the sight.

The juyce of Rew mixed with clarified honey, and dropped into the eye, a drop at a time, takes away dimness of sight. [p. 268]

To preserve a man's sight a long time.

Eat one branch of Rue, and another of Eye-bright every morning, with a Fig or two. This do three mornings every week. [p. 208]

A Medicine not only for the Eyes, but also for the Megrim.

Take the white of a new laid Egg, a spoonful of the best Ginger in powder, a spoonful of strong White-wine vinegar, and a spoonful of white Rose-water, if for the Eyes; of red Rose-water, if for the Megrim: beat them all together; and having made two Plaisters of Flax, for each Temple one, dip them in this Medicine, & bind them to the Temples with a cloth: this in three or four nights hath brought sight to such as have been blind eight weeks. If your eyes be gumm'd up in the morning, as it is like they will, wash them with a little white Rose or Eye-bright-water. [p. 208]

In his treatise on Headaches he notes that "there is always a pain in the roots of the eyes; *for the Tunicles of the eyes have their beginning from the Brain.*" [p. 17]

For Eyes that are swelled.

Take two spoonfuls of Womans milk, one spoonful of Rose-water, the pap of a roasted Apple, and the yolk of a new laid Egg; boil all these in a

[3] All the following quotations are from *LLa*.

Pewter Vessel over a Chafing-dish of Coals till it be thick; then spread it upon a cloth, and lay it to your eyes luke-warm when you go to bed; in the morning wash your eyes with Womans milk, and in twice or thrice it will cure you. [p. 210]

Against swolen Eyes.

An Oyntment made with Ivy-leaves and Hogs-grease, is excellent for Swelling of the Eyes. [p. 86]

To restore Sight.

The herb and root of Tormentil boiled in Wine, and the Wine drunk, and the herb laid plaisterwise upon the Eyes, restores the sight, though it have been lost many years. [p. 100]

To Cure the Blind. (Petrus Hispanus)

Tormentile boiled in Wine, and the Wine drunk for ordinary drink; and the Herb it self, that was boiled, being applied Plaister-wise to the Eyes at night, helpeth such as are so blind they cannot see at all. [p. 264]

To cure sore eyes and Head-ach.

The water of Marigolds helps Diseases in the Eyes, and takes away pain in the head. [p. 276]

A precious remedy that cures the old Head-ach, and Eyes, and Rhewms.

Beat Bay salt into powder by it self, and as much Cummin-seed by it self, and as much common Fennel-seed by it self, then mix them together with a little Rose Vinegar, over a Chafingdish of Coals, and apply it hot upon a cloth to the nape of the neck near the head; the next night change it. This is a most precious Medicine, for it cures the most inveterate Head-ach, though of never so long continuance, or never so violent; besides it clears the Eye-sight, and draws away the superfluous humours of the head. [p. 272]

For such as have a skin growing before their Eyes.

Take a sawcer full of white Rose-water, and as much Myrrhe as a Nut, beaten into fine powder; bind up the Myrrhe in a fine linnen cloth, and let it lie in the Rose-water twelve hours, by which time your Rose-water will begin to look red; drop this water into the Eye, and it will cure it to admiration. [p. 209]

For the Pin and Web[4]

Take Ivy-leaves that grow upon an Ash-tree, wipe them clean, stamp them, and strain them, having added a little womans milk to them; if it be a man that hath the sore eye (saith mine Author) let it be the milk of a woman that bore a girl: if a woman, the milk of a woman that bore a boy, I can find no reason for this, but shall deliver my own opinion, and my reason for it: If it be the left eye of a man, or the right eye of a woman, let it be the milk of a woman that bore a girl, because those eyes are under the Moon; if it be the right eye of a man, or the left of a woman, let it be

[4] An old term expressive of two concurrent symptoms of eye diseases, or a single disease of the eye. It presumably had reference to the surface of the eye having a pinhead spot or excrescence, called a 'pin', and a film, called a 'web'. It might have been Pterygium or phlyctenular conjunctivitis. B.C.

the milk of a woman that bore a boy, because those eyes are under the Sun. But to proceed, the sorer the eye is, the more juyce you must take. Drop this into the diseased eye with a feather four times a day. [p. 209]

To Cure a Pin and Web in the Eye.

There is a stone to be found in the head of a long Snail, which being beaten into fine powder and blown into the Eye, take away the Web, spots or other infirmities that annoy it. [p. 107]

Take nine Hog-lice, we call them Wood-lice in *Sussex*, stamp them with a little juyce of Bettony, strain it, and drink it warm in the morning; the doing so three mornings together cures the Web in the Eye. [p. 256]

Against a Web in the Eye

The marrow of a Goose wing, and the older the Goose is, it is so much the better, a little of it being put into the Eye, breaks the Web there, though it be never so strong, or of so long continuance. [p. 74]

Another Receipt for Cure of the Eyes.

The milk of a Woman's breast is excellent for the foregoing infirmity of the Eyes, only with this Proviso; if the party afflicted be a Male, let it be the Milk of a Woman that bare a Male; if a Female, the contrary. [p. 74]

For the Eyes that are Blood-Shot.

Beat the white of new-laid Eggs very well, and moisten a little fine Flax with it, and apply it to the Eye being close shut, at night going to bed, in the morning take it off, and wear a green cloath before the eye all day; the next night renew it; and in three nights it will cure. [p. 207]

Against red Eyes.

Wormwood stamped with the white of an Egg, and apply'd to the eyes by way of a plaister, is a notable way to take away the redness and bloodyness of them. [p. 267]

Against watery Eyes.

Pieces of Amber tyed to the nape of the neck, helps the watering of the eyes. [p. 106]

For sore eyes proceeding from heat.

Take the juyce of Housleek, Womans milk, Rose-water, and the white of an Egg well beaten, mix all these together and dip Flax in it, and lay it to your eyes when you go to bed; binding it on, it is a most excellent remedy. [p. 210]

For cold Eyes.

Drop a drop of good *Aqua Composita* into the Eye that is annoyed with cold, and you will find it a present remedy to recover the sight. [p. 91]

To draw Rheum back from the Eyes.

Take an Egg and roast it hard, then pull off the shell, and slit it in two, and apply it hot to the nape of the neck, and thou shalt find ease presently. [p. 208]

Against Rheum in the Eyes.

Beat the white of an Egg, and then wet a Cole-wort-leaf in it, and lay it to the Eye that runs a water, at night when you go to bed, and by morning it will help you. [p. 84]

For such as have lost their sight by reason of the small-Pox.

Take Pimpernel, stamp it, and strain it, and put the juyce of it into the eye with a feather morning and evening.

The same is an excellent remedy for a Pin and Web, and Pearl; and indeed in general Pimpernel is a gallant remedy for the Eyes. [p. 209]

For Eyes that are blasted.

Only wear a piece of Black Sarcenet before thy eye, and meddle with no Medicine, only forbear wine and strong drink. [p. 207]

For a hurt in the Eye with a stroke.

Take Agrimony, and bruise it very well ,and temper it with White-wine, and the White of an Egg; spread it pretty thick upon a cloth, like a Plaister, and apply it to the outside of the Eye-lid, and although it be almost out, it will cure it. [p. 208]

Culpeper scrutinizes the "Colledge's" lists, and states that their "Simples" are only named and not described. "It seems the Colledge hold a strange opinion 'That it would do an English man a mischief to know what the herbs in his garden are good for.' " Culpeper, however, intends to "impartially reveal to them [his country] what the Lord hath revealed to me in Physick." He describes the flowers and lists the 'parts of the Body they are apropriated to.' He comments on the directions given to the Apothecaries concerning "Juyces," "things bred of Plants, and that every child knows," and on the catalogue "of what Parts of Living Creatures and Excrements they must keep in their Shops." Thus he "led the Courteous Reader on through the Colledge's reformed and refined Dispensatory"—" 'tis comfortable enough for me that I am belov'd of the honest; my reward I expect hereafter in that place whereinto no Earthly-minded nor selfish man shall come."

Here are some quotations from the preparations appearing in the *Dispensatory* of use for affections of the eyes:

Doronicum. The Juyce helps hot Rhewms [also spelled Rewms[5]] in the eye. [p. 6]

Glycyrrhize—the pouder put into the Eye, is a special remedy for a Pin and a Web. [p. 7]

Zingiberis—cleers the sight. [p. 10]

Absinthium. Wormwood—cleers the sight. [p. 13]

Anagallis, mas, fœmina. Pimpernel . . . amends the sight. [p. 14]

[5] A watery discharge from the mucous membrane of the eye as in catarrh.

Betonica Pauli. Pauls Betony—stops defluxions of humors that fall from the head into the eyes. [p. 15]

Caulis. Cabbages—help dimness of the sight. [p. 16]

Cichorium. Succory—outwardly applied, helps hot rewms in the eyes. [p. 17]

Cyanus. Blewbottle—the juyce dropped into the eye, helps the inflamations thereof. [p. 17]

Euphragia. Eybright—the very sight of it refresheth the eyes . . . and makes old mens eyes young; a drachm of it taken in the morning is worth a pair of Spectacles, it comforts and strengtheneth the memory, outwardly applyed to the place it helps sore eyes. [p. 18]

Herba Camphorata. Stinking Ground-pine is of a drying faculty, and therefore stops defluxions either in the eyes, or upon the Lungues . . . strengthens the Nerves. [p. 19]

Lotus urbana. Sweet Trefoyl—clenseth the eyes gently of such things as hinder the sight . . . secures garments from moths. [p. 20]

Meliotus—the juyce dropped into the eyes, cleers the sight. [p. 21]

Plantago. Plantane—outwardly it cleers the sight. [p. 22]

Senna—takes away dulness of sight, preserves youth, . . . helps melancholly and madness, keeps back old age. [p. 24]

Rosemary-flowers, strengthen the brain exceedingly and resist madness, cleer the sight. [p. 26]

The flesh of Vipers being eaten, cleer the sight . . . neither is there any better remedy under the Sun for their bitings than the head of the Viper that bit you." [p. 30]

Parts of Living Creatures and Excrements.

The head of a cole black Cat being burnt to ashes in a new pot, and some of the ashes blown into the eye every day, helps such as have a skin growing over their sight, if there happen any inflamation, moisten an Oak leaf in water and lay over the eye; *Mizaldus* saith (by this one only medicine) cured such as have been blind a whol yeer. [p. 31]

Belonging to the Sea.

Sperma Caeti—is well applied outwardly to eating Ulcers, the marks which the small pocks leave behind them, it cleers the sight. [p. 32]

Simple Distilled Waters.

White Rose-water is generally known to be excellent against hot rhewms, and inflammations in the eyes, and for this it is better than the former [Damask Rose-water].

Fennel water . . . if you wash your eyes with it, it cleers the sight.

The eyes being washed every morning with Eyebright water, most strangely cleers and strengthens the sight. [p. 60]

Physical Wines.

Eyebright Wine—wonderfully cleers the sight being drunk, and revives the sight of ancient men: A cup of it in the morning is worth a pair of Spectacles. [p. 71]

Culpeper here comments on the College's anger concerning his criticism of the making of black cherry wine by the College's formulas. He notes that the College's Wine was "with never a drop of Wine in it, and the juyce will not keep without it." "It may be they followed their Patriarks the Papists, as wel in this, as in their reasons, why Physick must not be printed in our mother tongue, and they were minded to pop you off with the juyce, and drink al the wine themselves: Or to judge as modestly as can be judged, they were so mad because I had translated their former, that anger so besotted them in this, that they knew not what they wrote," and then he quotes "Impedit Ira animum ne possit cernere verum," which he translated "Unbridled anger takes away mens knowledge; And clouds the Truth (and so it did the Colledg)."

Acetum Scilliticum. Or Vinegar of Squils—A little of this medicine being taken in the morning fasting, and walking half an hour after, preserves the body in health, to extream old age, . . . it maketh . . . an acute sight. [p. 72]

In commenting on the College's directions for the making of a certain powder from herbs he says: "I see now the Colledg is not too old to learn how to dry Herbs. . . . I would they would learn humility and honesty, and mind the common good, and consider what infinite number of poor creatures perish daily (whom Christ hath both purchased to himself, and bought with the price of his blood) through their hiding the rules of Physick from them, who else happily might be preserved if they knew but what the Herbs in their own Gardens were good for; with what face will they answer for this another day before God and the Lord Jesus Christ and the holy Angels? A few thoughts of this might put them upon such principles as might be a lengthning to their Tranquility; but why do I spend time about them, seeing there is little hope they will be honester? [p. 128]

PILLS

Pilulae Aureae [chiefly Aloes]—quicken the senses, especially the Sight. [p. 140]

Pilulae Mastichinae. Or, Mastich Pills. They purge very gently, but strengthen much, both head, brain, eyes. [p. 141]

Pilulae sine Quibus. Or, Pills without which [Aloes, etc.]—purgeth . . . melancholly from the head, makes the sight and hearing good. [p. 142]

Pilulae Arabica—helps head-ach, megrim, vertigo, . . . and Authors say it preserves the sight, . . . but have a care you take not too much of it. . . . I pray be not too busie with it, and say I warned you of it. [p. 144]

TROCHES

Troches—are usually made into little flat thin cakes. . . . Some print Images (as of Serpents upon Troches of Vipers) upon them, some guild them with Leaf-Gold, some do neither. They were first invented by the Ancients. [p. 145]

Sief is a general term which the Arabians give to all medicines apropriated to the Eyes, of which this is one, and a good one to dry up rewms there. [p. 149]

OYNTMENTS

Unguentum Tutiae. Or, Oyntment of Tutty— a cooling, drying Oyntment apropriated to the eyes, to dry up hot and salt humors that flow down thither, the eye-lids being anointed with it. [p. 167]

PLAISTERS

Emplastrum Cephalicum. [Rosin, black pitch, Dove's dung, etc.]— to strengthen the brain . . . easeth the eyes of hot scalding vapors that annoy them. [p. 174]

Emplastrum Epispasticum [Mustard seed, cantharides, etc.] Many people use [it] . . . for Rhewms in their eyes, if they please to lay a Plaister of this there, it will do it. [p. 176]

Of the diagnostic names and the affections mentioned, many have become obsolete. It is to be noted that there were not then available optical instruments for minute examinations so that what has been listed was obtained solely by the observer's own unaided eyes. Indeed, it was not until MacKenzie employed lenses (in 1830) for the focal pointing and, in 1850, Helmholtz's contrivance of an 'ophthalmoscope' that the eye could be examined in its entirety. Many plants, minerals, and animal substances which Culpeper employed no longer exist. It is interesting to note that some of the plants employed were chosen from a fancied resemblance to the eyes themselves, such as the eyebright.

These extensive quotations from the *Dispensatory* are, without doubt, Culpeper's work. It was the first of his works which attracted wide attention. He was but thirty-three years of age when the first edition appeared. As already stated, he had read much and easily from the Latin works then accepted by the learned profession. When one hears passages from the *Directory* read aloud, it is as though one were listening to an old romance. Its quaint speech, its childlike acceptance, its simple descriptions fascinate the modern reader. Quite properly, no pathological descriptions are given in the *Directory*. The definite naming of the affections noted surely indicates how well defined the diseases were and commonly known to all. Shakespeare used the term "pin and web" in *A Winter's Tale,* Act 1, Scene 2). *The Dispensatory* is a striking exposition of

domestic, or one might call it "farm house," medicine. It clearly shows how great was the knowledge of the usefulness of plants in the medical treatment of mankind—a knowledge utilized by the profession, although masked by the *Dispensatory's* Latin. Culpeper was hated and condemned because he made that knowledge available in English and thus well understood by the people. He was, however, a quack and he habitually accompanied his therapeutic directions by astrological jargon.

Culpeper's work was well conceived, nevertheless, and shows wide research—wide indeed when one considers the state of medical practice of the day. Much of this knowledge was included in his many works. He must have had great influence upon his generation and the generation following, as his books were issued in editions into the nineteenth century. It is regrettable that few pathological descriptions are given in his accounts of the affections for which he prescribed the homely remedies he so clearly outlines. One must search elsewhere for any description of "Rheum" or "Pin and Web." The sophisticated of today may well spare the time to study the writings of one who has told us of their curing.

Culpeper crowded much into his short life. He died on 10 January 1654, at the age of thirty-eight.

Mother's Milk and the Offspring

LEONELL C. STRONG*

"An houre, [honor?][1] were not I thine onley nurse, I would say thou had'st suckt wisedome from thy teat."

Romeo and Juliet, I.3, 1623 Folio.

THE discovery of the milk agent[2] in the etiology of adenocarcinoma of the mammary gland in mice has changed, considerably, ideas concerning the fundamental nature of this neoplasm. The idea, however, that the characteristics or contents of the milk may influence the offspring is an old one. Ehrlich in 1892[3] reported that antibodies could be transmitted through the milk. This observation has been verified by Culbertson (1940)[4] and by Berry and Slavin (1943).[5]

An attempt to trace historically the origin of the idea that the mother or wet nurse could influence the offspring through the milk soon revealed that it was lost in ancient times. During this survey I decided to read again Burton's *Anatomy of Melancholy* (1628)—that storehouse of vast medieval and classical learning. The search was not in vain. The following quotation is taken from the 1826 edition of the *Anatomy* edited by Democritus Junior[6] in the section on the study of the Causes of Melancholy:

Non-necessary, remote, outward, adventitious or accidental causes: as first from the Nurse, etc.

Of those remote, outward, ambient, necessary causes, I have sufficiently discoursed in the precedent member. The non-necessary follow; of which (saith Fuchsius) no art can be made, by reason of their uncertainty, casualty, and multitude; so called not-necessary, because (according to

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1 Modern commentaries (Clark and Wright, American ed.) render "houre" of the 1623 folio as "honor." However, the original "houre" was used "somewhat indefinitely for a short or limited space of time, more or less than an hour" (*Oxford English Dictionary*) and should probably be retained. It appears in this sense in another part of *Romeo and Juliet,* "Sad houres seeme long" (I.1.167).

2 Bittner, J. J. Some possible effects of nursing on the mammary gland tumor incidence in mice. *Science,* 1936, *84,* 162. See also Breast cancer in mice as influenced by nursing. *J. nat. Cancer Inst.,* 1940, *1,* 155-168.

3 Ehrlich, P. Ueber Immunität durch Vererbung und Säugung. *Z. Hyg. InfektKr.,* 1892, *12,* 183-203.

4 Culbertson, J. T. The natural transmission of immunity against *Trypanosoma duttoni* from mother mice to their young. *J. Immunol.,* 1940, *38,* 51-66.

5 Berry, G. P. and Slavin, H. B. Studies on herpetic infection in mice. I. Passive protection against virus inoculated intranasally. *J. exp. Med.,* 1943, *78,* 305-313.

6 Burton, Robert. *The anatomy of melancholy,* by Democritus, Junior. London, 1826.

Fernelius) they may be avoided, and used without necessity. Many of these accidental causes, which I shall entreat of here, might have well been reduced to the former, because they cannot be avoided, but fatally happen to us, though accidentally, and unawares, at some time or other: the rest are contingent and evitable, and more properly inserted in this rank of causes. To reckon up all, is a thing unpossible; of some therefore most remarkable of these contingent causes which produce melancholy, I will briefly speak, and in their order.

From a childs nativity, the first ill accident that can likely befall him in this kind, is a bad nurse, by whose means alone he may be tainted with this malady from his cradle. Aulus Gellius brings in Phavorinus, that eloquent philosopher, proving this at large, that there is the same vertue and property in the milk as in the seed, and not in men alone, but in all other creatures. He gives instance in a kid and lamb: if either of them suck of the others milk, the lamb of the goates, or the kid of the ewes, the wooll of the one will be hard, and the hair of the other soft. Giraldus Cambrensis confirms this by a notable example, which happened in his time. A sow-pig by chance sucked a brach [hound dog], and, when she was grown, would miraculously hunt all manner of deer, and that as well, or rather better, than any ordinary hound. His conclusion is, that men and beasts participate of her nature and conditions, by whose milk they are fed. Phavorinus urgeth it farther, and demonstrates it more evidently, that if a nurse be misshapen, unchaste, unhonest, impudent, drunk, cruel, or the like, the child that sucks upon her breast will be so too: all other affections of the mind, and diseases, are almost ingraffed, as it were, and imprinted in the temperature of the infant, by the nurses milk, as pox, leprosie, melancholy, &c. Cato, for some such reason, would make his servants children suck upon his wives breast, because, by that means, they would love him and his the better, and in all likelihood agree with them. A more evident example that the minds are altered by milk, cannot be given, than that of Dion, which he relates of Caligula's cruelty; it could neither be imputed to father nor mother, but to his cruel nurse alone, that anointed her paps with blood still when he sucked, which made him such a murderer, and to express her cruelty to an hair; and that of Tiberius, who was a common drunkard, because his nurse was such a one. *Et si delira fuerit* (one observes), *infantulum delirium faciet;* if she be a fool or a dolt, the child she nurseth will take after her, or otherwise be misaffected; which Franciscus Barbarus proves at full, and Ant. Guivarra: the child will surely participate. For bodily sickness, there is no doubt to be made. Titus, Vespasian's son, was therefore sickly, because the nurse was so (Lampridius): and, if we may believe physicians, many times children catch the pox from a bad nurse (Botaldus). Besides evil attendance, negligence, and many gross inconveniences, which are incident to nurses, much danger may so come to the child. For these causes Aristotle, Phavorinus, and Marcus Aurelius, would not have a child put to nurse at all, but every mother to bring up her own, of what condition soever she be; for a sound and able mother to put out her child to nurse, is *naturae intemperies* (so Guatso calls it): 'tis fit therefore she should be nurse her self; the mother will be more careful, loving and attendant, than any servile woman, or such hired creatures; this all the world acknowledgeth: *convenientissimum est* (as Rod. a Castro, *de nat. mulierum, lib.* 4. c. 12, in many words confesseth) *matrem ipsam lactare infantem,* (who denies that it should be so?) and which some women most curiously observe; amongst the rest, that queen of France, a Spaniard by birth, that was so precise and zealous in this behalf, that when,

in her absence, a strange nurse had suckled her child, she was never quiet till she had made the infant vomit it up again. But she was too jealous. If it be so, as many times it is, they must be put forth, the mother be not fit or well able to be a nurse, I would then advise such mothers (as Plutarch doth in his book *de liberis educandis,* and S. Hierome, *lib. 2. epist. 27. Laetae de institut. fil.* Magninus, *part. 2. Ref. sanit. cap. 7,* and the said Rodericus) that they make choice of a sound woman, of a good complexion, honest, free from bodily disease, if it be possible, and all passions and perturbations of the mind, as sorrow, fear, grief, folly, melancholy: for such passions corrupt the milk, and alter the temperature of the child, which, now being *udum et molle lutum,* is easily seasoned and perverted. And if such a nurse may be found out, that will be diligent and careful withall, let Phavorinus and M. Aurelius plead how they can against it, I had rather accept of her in some cases than the mother her self; and (which Bonacialus the physician, Nic. Biesius the politician, *lib. 4. de repub. cap. 8.* approves) some nurses are much to be preferred to some mothers. For why may not the mother be naught, a peevish drunken flurt, a waspish cholerick slut, a crazed piece, a fool, (as many mothers are) unsound, as soon as the nurse? There is more choice of nurses than mothers; and therefore, except the mother be most vertuous, staid, a woman of excellent good parts, and of a sound complexion, I would have all children, in such cases, committed to discreet strangers. And 'tis the only way (as by marriage they are engrafted to other families) to alter the breed, or, if any thing be amiss in the mother, (as Ludovicus Mercatus contends, *Tom. 2. lib. de morb. haered.*) to prevent diseases and future maladies, to correct them and qualifie the childs ill-disposed temperature, which he had from his parents. This is an excellent remedy, if good choice be made of such a nurse.

Apparently, the concept that the nurse through her milk could influence the characteristics of the offspring was held by the astute Bacon since, in discussing the topic of the "passages of sympathy between persons of near blood; as parents, children, brothers, sisters, nurse-children, husbands, wives, etc.," he includes the nurse among close relatives.

The development of Weismannian, DeVriesian, and Mendelian biology has discredited any transmission of characteristics except through the genes. We have been taught that the genes are "the differential determiners of heredity" and to look upon them as having exclusive capacity of determining the offspring.

Thus biology has thrown out, and rightly, the ancient and medieval ideas of prenatal impressions, etc. Many observations and pseudo-observations handed down from generation to generation, such as those quoted by Burton, have also been ruled out. This has been due in no small degree to the impetus given by the method of induction through the influence of the preëminent Bacon.[7] Modern science has been the application of experimental proofs or demonstrations rather than continuous references to classical

[7] Bacon, Francis. *Novum organum.* London, 1620.

authors who may have been wrong in the first place; that is, the replacement of authority by experimentation.

More recent advances, however, have demonstrated (i) plastid inheritance in plants which is obviously cytoplasmic in nature, (ii) the placental transmission of maternal hormones and other entities, such as the production of witch's milk' with a stimulated mammary gland in the newborn, (iii) the transmission of viruses, antibodies, etc. in the mother's milk, and (iv) the effects of parental age on the characteristics of the offspring. All four of these biological processes affect the offspring and they all appear to be non-genic in nature. Whether they can permanently change the characteristics of the species remains to be proven. That the effects of parental age are cumulative and reversible, such as longevity in cladoera,[8] suggests perhaps one function of the gene may be a stabilizing influence toward keeping the species constant, and new, permanent changes may only be brought about by mutations. But plasmagenes and viruses can mutate also.

The introduction of the milk agent into a mouse may have either a temporary or permanent effect upon the incidence of adenocarcinoma of the mammary gland—depending upon the genetic constitution of the individuals in a given population. For example, the milk agent introduced into a C_{57} mouse (cancer resistant) is incapable of increasing itself. It will be transferred through the milk into the young but will disappear after a few generations. On the other hand, the introduction of the milk agent into a C_3H mouse (cancer susceptible but previously freed of the agent) will bring about, as far as known, a permanent change in the appearance of adenocarcinoma of the mammary gland; at least the neoplasm will continue to appear in mice through many generations. Here we have an intimate association between a gene (genetic constitution) and the activity of an extrinsic agent.

In the analysis of exceptional cases of heredity, such as the four classes cited above, extreme caution should still be used. Such a case in point is the inheritance of "poky" in Neurospora. According to the authors Mitchell and Mitchell[9] (1952), this "suggests the possibility that something is being transmitted through the cytoplasm. However, with so little information available as to

[8] Lansing, A. I. A transmissible cumulative and reversible factor in aging. *J. Geront.*, 1947, *2*, 228-239.

[9] Mitchell, M. B. and Mitchell, Herschel K. A case of "maternal" inheritance in Neurospora crassa. *Proc. nat. Acad. Sci.*, 1952, *38*, 442-449.

the possible nature of the defect, conclusions regarding the mechanism of its transmission would necessarily be highly speculative in nature." Perhaps this degree of caution should be applied to other biological observations which appear on the surface to be exceptions to classical genetic interpretations by gene action. It would seem, however, that the problem of transmission of characteristics or agents that determine characteristics of the offspring from one generation to the next is far from being solved.

Ideas in science as well as in other branches of human knowledge are old, stemming in many cases from ancient times. The observations upon which the ideas were based were, as at present, sometimes good and sometimes faulty. The observations may have been valid, but the conclusions wrongly colored by the philosophical system then in vogue.

A wet-nurse or the mother can influence the child through the milk—not perhaps in the old manner discussed by Burton, but by the transmission of particulate bodies such as viruses, antibodies, hormones, and probably other agents.

Notes and Queries

Edited by Ralph H. Major, M.D.,* and Dorothy M. Schullian, Ph.D.**

Sir Charles Bell's IDEA OF A NEW ANATOMY OF THE BRAIN

In the autumn of 1951 in the dispersal of books from the library of Richard Payne Knight, antiquary and art connoisseur, at Downtown Castle in Herefordshire, was a presentation copy from the author to Payne Knight of the privately printed book in which Bell announced his discovery of the distinct functions of the spinal nerve roots, a discovery which rightly or wrongly has been described as "the greatest physiological advance since Harvey's *De motu cordis.*"

One hundred copies only of the *Idea of a New Anatomy of the Brain; submitted for the Observations of his Friends; by Charles Bell, F.R.S.E.* were privately printed in August, 1811. It is a 12mo of thirty-six pages with no normal title, the above information being printed on a bastard title. There is no publisher, place, or price on this page. The printer's imprint is on the verso of the bastard title, and at the foot of page 36, "Strahan and Preston, Printers-Street, London." Bell's brother-in-law, who was bibliographically a hundred years in advance of his age, ferreted out details of publication which could never at this date be obtained.

I am not here concerned with the Magendie claims for priority over Bell, but the fact that as early as 1809 Bell was ready to print is worth recording. In a letter to his brother and close confidant, George Joseph Bell, he wrote (December 1809): "Could you get a little tiny book printed for me, of twenty pages of the smallest 12mo? for I must set down the manuscript of the Brain again, stated shortly for my friends."

On page 22 is the passage which clearly indicated that Bell had discovered the separate functions of the spinal nerve roots: "On laying bare the roots of the spinal nerves, I found that I could cut across the posterior fasciculus of nerves, which took its origin from the posterior portion of the spinal marrow without convulsing the muscles of the back; but that on touching the point of the knife, the muscles of the back were immediately convulsed." This privately printed opuscule culminated in *The Nervous System of the Human Body* (1830).

When in 1930 Professor Fulton in his *Selected Readings in Physiology* (to which I owe so much of interest and information) discussed the booklet, he could cite only two copies—those in the British Museum and the Armed Forces Medical Library of the U.S.A. A note in the *Journal of the History of Medicine* (January 1946) mentions a third copy but unfortunately does not place it.

Since discovering the Payne Knight copy I have been stimulated to a search for existing copies and can now locate nine. These are:

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** Cleveland, Ohio.

(1) British Museum. Presentation to Sir Joseph Banks.

(2) Armed Forces Medical Library, U.S.A. Presentation to Dr. Samuel Borrowe.

(3) Payne Knight copy. Presentation. Present location not known but traceable.

(4) Royal College of Physicians, London.

(5) Royal College of Surgeons, London. Presentation copy to Dr. Roget. Presented to the library by Lady Bell, who shared her brother's care for the spread of the fame of her husband.

(6) Royal Society of Medicine, London. Inscribed *From the Author* but recipient not known. In the Sir David Ferrier Memorial Bequest by Aileen Singer.

(7) University College, London. Bequeathed to the Library by Professor R. E. Grant, F.R.S., in 1874.

(8) Royal College of Physicians, Edinburgh.

(9) Signet Library, Edinburgh.

Alexander Shaw, the surgeon, to whose concern for the fame of Bell reference has already been made, published an invaluable account of the book and Bell's subsequent researches in the October 1868 issue of the *Journal of Anatomy and Physiology*. By this time the book was unobtainable and a manuscript copy handed around at a meeting of the British Medical Association in August 1868 inspired a resolution to reprint it. Shaw's notes accompanied the reprint in October 1868. They record Bell's chagrin at the complete lack of response by distinguished anatomists and physiologists, since "not a single individual favoured him with observations, as solicited on the title-page."

Shaw also reprinted the memorandum from Bell's papers of the persons to whom he intended to send copies. All of the four persons mentioned above appear in that list. In addition to the forty-eight persons named by Bell there is a direction in one of his letters to George Joseph to send a copy to Sandford, Bishop of Edinburgh.

Alexander Shaw states that his elder brother John, pupil of, and later assistant to, Bell, was the first (1822) to draw attention to Bell's discovery. A passion for accuracy compels me to point out that probably early in 1812 the *Idea* was reprinted in the *Baltimore Medical and Philosophical Lyceum* for October-December 1811.

Among the names in Bell's list is that of "Dr. Winthrop." Might this not be a Massachusetts medico? The name is famous enough in those parts.

I am extremely grateful to the librarians who have replied so fully to my enquiries and look forward to tracing further copies and especially to news of Bell's manuscripts which passed to the daughter of George Joseph Bell. She died unmarried shortly before 1874. Alexander Shaw lived till 1891. He was the most probable owner of the paper at that date.

Besides the 1868 reprint, there is a reprint of the significant passages in Professor Fulton's book and a complete reprint in *Medical Classics,* Volume 1, 1936-37.

ERIC OSBORNE

Congratulations to George Sarton

The History of Science Society, which was founded by George Sarton in 1924 as an international body aiming to advance interest in the history of the sciences, gave a testimonial dinner in Washington on 28 December in honor of Dr. Sarton on the occasion of his retirement, both from his post at Harvard and from the Editorship of *Isis*—the Society's official channel of publication which he had founded in Belgium in 1913 before he came to this country. The dinner, as well as the annual meeting itself, was presided over by the President-Elect, Dr. Dorothy Stimson, Professor of History at Goucher College. Dr. Stimson made happy references to Dr. Sarton's work and to the inspiration which he has given to all those throughout the world who concern themselves with the history of science. She also announced that the Council of the Society had appointed Dr. I. Bernard Cohen to succeed Dr. Sarton as Editor of *Isis,* and that Miss Marie Boas as Secretary and Mr. Charles Gillispie as Treasurer were succeeding the Secretary-Treasurer, Mr. Kilgour.

The Journal congratulates Dr. Sarton on having brought out in the brief period since 1913 a total of fifty-three volumes of *Isis* and its companion journal, *Osiris.* There have been few instances in the history of modern scientific effort of such sustained productivity, and all this burden of editorial responsibility represents but one facet of his activities. He has published seven large volumes of his *Introduction to the History of Science* and, most recently, the first of his projected eight-volume *History of Science* which is reviewed by Dr. Temkin in this number of the *Journal.* We hope that Dr. Sarton's retirement will afford him full opportunity to complete this heroic task; and we also congratulate Harvard University on having given support to one of the great scholars of our time.

J. F. F.

*Museo Nazionale della Scienza e della Tecnica**

The restoration of the Museo Nazionale della Scienza e della Tecnica means for the city of Milan the achievement of an old and noble aspiration. The inauguration of the Museum in Leonardo's name early in 1953 will constitute a most favorable omen for the new institution, which draws inspiration from its ancient Ptolemaic prototype, the *Mouseion,* which was named after the Muses.

* A fuller account of the Museo will be found in a paper by Guido Ucelli, "The National Museum of Science and Technics and the exhibition in celebration of the fifth centenary of the birth of Leonardo da Vinci," which appeared in the *Rivista di Ingegneria* for December 1952. In the February 1953 issue of the same journal there is an article on "The new centre of consultation for the Technical and Scientific Press at the National Museum of Science and Technics, Milan" by Carlo Rossi.

Just as Milan, where Leonardo worked most actively as an artist, scientist, and technician, was accepted as the most suitable city for the Museum, so the particular site chosen there is the ideal location in that city. The buildings which once constituted the imposing Monastero Olivetano of S. Vittore are among the most remarkable of the Lombardic city. Their majestic, high, covered galleries looking out on airy gardens, their long and ample arcades, the old library which in its three mystic naves preserved the codices of ancient knowledge, all these date from the height of the Renaissance. To this complex worthy additions were made in the seventeenth century. The whole reflects a serene calm and grandeur well suited to house a project which honours Leonardo. With little difficulty one can visualize the great master himself strolling in that solemn monastic atmosphere in the closing years of the Sforza power in Milan.

The surroundings are, indeed, full of association with Leonardo. At the end of the fifteenth century, while he was at work on "The Last Supper," he had set up a workshop on a large piece of uncultivated land; and here also was the famous vineyard which he obtained from Ludovico il Moro. Luca Beltrami and other scholars are of the opinion that the present course of the Via S. Vittore and the general layout of the streets in that part of the city may very well have been based on plans by Leonardo. The new Cloister of the Olivetani, conceived with such a magnitude as to compete with the Cloister of the Grazie, was begun on 8 September 1508, while Leonardo was in Milan. It was constructed on the site of an old Benedictine monastery which was surrounded by a large burial ground. On this area was a strong Roman wall, the substructures of which are visible today. It formed a polygonal enclosure, was fortified by towers at the corners, and enclosed the grandiose mausoleum which was still in existence at the end of the sixteenth century and which, according to tradition, sheltered the porphyry sarcophagus of Valentinian II and graves of other members of the imperial family.

Leonardo investigated deeply and acutely the artistic works of the past, and he also made many innovations himself in architecture. It is certain that he studied these old monuments. He undoubtedly watched, if he did not plan, the construction of the Cloister of S. Vittore. Thus, it is surely not arbitrary to imagine his venerable figure moving among the rising walls of the majestic buildings.

In this noble seat the exhibition will document the extent of Leonardo's instruments and inventions, their priority, the applications made of them centuries later, and finally the influence of the master's thought on the development of science and technology in sublime harmony with art. When the celebration of the fifth centenary of his birth is ended, the Museum will start specific activity to achieve these goals. Historical truth will always be the primary criterion in the program, but it will be illuminated wherever possible by artistic principles, by the interpretation of the physical laws in their relation to functional harmony and aesthetic perfection.

A worthy and rich collection of medical books and journals, accessible to all scholars for consultation, will form an important centre of medico-historical culture. A collection of ship models and of objects and instruments pertaining to the history of navigation will offer a wide and suggestive historical picture of that means of transportation. Other collections are being prepared with the help of national institutes of research, of industry, of public and private foundations. In all its work the Museum benefits by the invaluable assistance of the great industrialist Guido Ucelli, who has given to it a passionate devotion and great personal authority.

In this home which is so rich in associations with Leonardo the Museo Nazionale will become the headquarters also of the main cultural associations of the city. It should be eventually a meeting place for all scholars who take an interest in problems of the history of science.

ARTURO CASTIGLIONI†

D. J. Davis Lecture

The tenth D. J. Davis lecture on Medical History at the University of Illinois College of Medicine, Chicago, will be given on May 6th by Dr. Richard H. Shryock, Director, Institute of the History of Medicine, The Johns Hopkins University. The title of his lecture is "Changing Concepts in American Medicine over Three Centuries." The lectureship was established in 1943 by the associates and friends of Dr. David J. Davis upon his retirement as Dean of the College of Medicine.

A Unique Copy of the 'Fabrica' of Vesalius

The Cushing Collection has recently been fortunate in adding to its Vesalian holdings what is reported to be a *unicum*. In commemoration of the four hundredth anniversary of the publication of the *De humani corporis fabrica* the Verlag K. F. Koehler's Antiquarium at Leipzig had undertaken to issue a facsimile of the volume with an introduction by Prof. Dr. Curt Elze of Würzburg. The sheets were all printed with the exception of Professor Elze's foreword but were not bound because that process was not possible during the war. The sheets were all taken for safety to a little town in the neighborhood of Leipzig. There they escaped the bombs but fell into the hands of the Russian troops. Repeated enquiries have elicited no news of their fate.

The Press had sent two complete copies to Professor Elze at Würzburg where he housed them in the Anatomical Institute. During the air attack on Würzburg on 16 March 1945 the city was to a large extent destroyed and a wing of the Institute was hit by two heavy bombs and ruined. The two examples of the Vesalius facsimile were found under the rubble greatly damaged. However, enough remained so that one complete copy could be assembled and this has been purchased by the Yale Historical Li-

† Died at Milan, 21 January 1953.

brary through the good offices of Professor Elze. In place of his intended introduction he has laid in a typewritten sheet giving a history of the volume. The facsimile has been beautifully executed on a fine, cream-colored rag paper, and the printing is sharp and clear.

It is entirely possible that in future years many copies of the facsimile may appear in Russia, but for the time being the copy in New Haven may be looked upon as the only example outside the U.S.S.R.

J. F. F.

Clyster Buttons

The clyster buttons described by Dr. Howard Dittrick in the last issue of this Journal have a counterpart in the field of medical medals. They present in fact the obverse and reverse of one medal. An issue of the obverse is numbered 4515 in the *Katalog der Sammlung Dr. Josef Brettauer Medicina in Nummis* (Wien, 1937), which describes the Brettauer collection at the University of Vienna. It is a cast in lead, 33 mm. in diameter, somewhat larger than the buttons which, I have been informed, have a diameter of 28 mm. My collection includes a cast of the reverse. It, like the buttons, is 28 mm. in diameter.

It is probable that medal and buttons, as well as Molière's reference to the clyster, have a similar origin in the caustic attitude of the public toward some of the therapeutic measures employed by physicians of the period. Involved also was perhaps the special interest in medical curiosities which is evident even in ancient medals and which still obtains today.

New York, New York BRUNO KISCH

School of Salerno

Physicians are accustomed to seeing in their professional journals advertisements for proprietary products which are presented with some historical illustration or reference. The practice is usually colorful and commendable. It was strikingly employed in Rome last year in a publication which reaches thousands of lay readers. In a series of advertisements in a daily newspaper a concern which sells milk of magnesia utilized Salernitan precepts, in Latin, and illustrated them with views done in the manner of early woodcuts. Architecture, furniture, and costumes were all designed to transport the reader back through the centuries while reminding him at the same time that if the precepts are violated today there is a ready remedy in the product advertised. The precepts utilized were:

1. *Custodit vitam qui custodit sanitatem* (He guards his life who guards his health), illustrated by a professor lecturing from his raised desk to benches of presumably zealous pupils.

2. *Aegrotos reddit homines cibus immoderatus* (Excess in eating brings on illness), illustrated by a gloomy patient who has overindulged, has taken to his bed, and is receiving treatment.

3. *Fetor oris fit ex putridis humoribus existentibus in stomacho* (Bad breath is due to putrid humors in the stomach), illustrated by a winsome maiden refusing the embrace of a young man whose breath is not sweet.

4. *Non cibos capias donec stomachus vacuetur* (Eat not a second meal until the first has been digested), illustrated by a young man at table who holds an expressive hand over his abdomen and decides to refuse further dainties.

5. *Quatenus vis comede, sed non praecordia laede* (Eat all you will, but not so much that you ruin your digestion), illustrated by a table scene in which the diners eat with due regard for the precept. Beneath the table an alert dog awaits scraps.

6. *Talis debet purgatio qualis non est laesiva naturae sed iuvativa* (The purgative should be such as helps nature without harm), illustrated by a physician, one hand raised in warning and the other holding a heavy tome. He is giving sound advice to an attentive matron who holds a young boy on her lap; a playful dog completes the domestic picture. There is little doubt that the matron is being informed of the harmful effects of strong cathartics.

This series was shortly followed by another in which the illustrations, done in the manner of bas-reliefs, showed how the ancients purged themselves—the Chinese by exposing the abdomen to moonlight, the Egyptians by inducing vomiting, the Babylonians by invoking the evil spirit and bargaining with him for cure, the Greeks by the use of the clyster which they had learned from the stork, the Romans by putting a duck on the abdomen and then an unweaned puppy, and finally the Arabs by a clyster of pepper. The contrast in method and effect with the product advertised was obvious.

D. M. S.

Neurological Symptoms during John Hunter's Last Illness

In the *British Medical Journal* for 27 December 1952 Sir Russell Brain, President of the Royal College of Physicians, draws attention to the neurology of Hunter's last illness, saying that his symptoms were "unusual enough to be intrinsically interesting, and they derive an added interest from the fact that the account of them given by Home (1794), John Hunter's brother-in-law, was clearly derived from Hunter himself and includes his own attempt to interpret them." It is generally assumed that Hunter died of angina, but there were many other complications which were possibly syphilitic in origin and had resulted from the self-inoculation of matter from "gonorrheal" pustules—this at least was the conclusion of the late Sir D'Arcy Power. There was dilatation of the aorta amounting to an incipient aneurysm, and "the description of the intimal surface [was] consistent with a syphilitic aortitis which had gone on to severe atheroma."

Prior to his death Hunter experienced hyperaesthesia to sensory stimuli, suggestive of the thalamic syndrome. Sir Russell believes that the sensory attacks, accompanied by pain and hyperalgesia in the left upper limb, were a variety of sensory epilepsy. To him they suggest a lesion of the

right parietal lobe extending rather deeply into the neighborhood of the optic thalamus. This new interpretation of John Hunter's illness by an eminent neurologist will be of interest not alone to Hunter scholars but to the general historian.

J. F. F.

Light

The light of medicine emanated from the temples of religion, and healing from Imhotep and Asklepios. Hippocrates augmented the feeble gleam through careful analysis of symptoms of disease. Galen cast the reflection far afield by the publication of studied observation and logical deduction. The light flickered during many centuries in mosque and monastery. Paracelsus wrote of this light in the vulgar tongue. Vesalius focused the light on fact rather than on tradition. Harvey, Malpighi, van Leeuwenhoek, Rokitansky, Bernard, Semmelweis, Ramón y Cajal, Osler, Banting added to its brilliance.

Stored in the volumes of our libraries are millions of rays of light. Your candle can increase the intensity and extend the range.

HOWARD DITTRICK

The Fifth Pura Medical History Conference

Dr. Henry E. Sigerist has just sent the Journal the programme of the Fifth Medical History Conference held at his villa, Casa Serena, in Pura, on 21-22 March. There were papers by Ch. Lichtenthaeler on the "social" origins of some scientific and philosophical concepts of the Greeks; N. Mani on Xenophon's medicine; H. Buess on the history of belladona. Dr. Sigerist read a short paper on the great ancient soft drink, Oxymel, and he produced a sample of the brew—the Roman Coca Cola—concocted according to Galen's recipe. At the Sunday session there were papers on Mesmer (R. de Saussure); Conrad Gesner (B. Milt); Guillaume Desnoües (E. Goldschmid).

Howard Dittrick Museum of Historical Medicine

By vote of the Trustees of the Cleveland Medical Library Association 13 April 1953, Dr. Henry H. Fertig was appointed Curator of the Howard Dittrick Museum of Historical Medicine. Dr. Dittrick, who with his wife has labored devotedly on behalf of the Museum since 1926, will continue his active interest in it and will work with Dr. Fertig in promoting its welfare and development.

Book Reviews

GEORGE SARTON. *A History of Science. Ancient Science through the Golden Age of Greece.* Cambridge, Harvard University Press, 1952. xxvi + 646 pp., illus. $10.00.

Reviewed by OWSEI TEMKIN, *Associate Professor of the History of Medicine, the Johns Hopkins University, Baltimore, Maryland, and Editor, Bulletin of the History of Medicine*

As professor at Harvard University, George Sarton has been teaching the history of science in a series of four courses devoted to Antiquity, the Middle Ages, fifteenth to seventeenth centuries, and eighteenth century to the present (p. viii). The lectures he delivered form the basis for this *History of Science.* Each course will be covered by two volumes, so that the present is but the first in an intended eight-volume work. A plan of such magnitude presupposes mastery of the factual side of the history of science, insight into its development as a whole, and ability to give it literary form. Nobody acquainted with Dr. Sarton would doubt his ability in all these respects, and the volume under review confirms the expectations. It combines great learning, a familiarity with all sciences, and a clear yet versatile style.

The volume is divided into three main parts, followed by an "epilogue," a brief general bibliography, and an index. The first part, "Oriental and Greek Origins," leads from prehistory over Egypt, Mesopotamia, and the Aegean culture to Greece, from Homer to Pythagoras. Part two is devoted to the fifth century, the time of the Persian wars and Athenian hegemony, of classical tragedy, of philosophy from Heraclitus to Socrates, of Herodotus and Thucydides, and of Hippocratic medicine. The last part discusses science in the fourth century from two focal points: Plato and Aristotle and their respective spheres of influence. Relatively short chapters are devoted to Xenophon and the later philosophical systems, notably Cynics, Epicureans, and Stoics. This short sketch does not do justice to the wealth of material contained in this volume, but it indicates some of the characteristics of Dr. Sarton's approach. The scope of his history is restricted "to our own ancestry" (p. x) which explains the omission of early Hindu and Chinese science. On the other hand, the book does not take "science" in the usual limited sense. In addition to "natural science," it includes such subjects as historiography, geography, a good deal of philosophy, and even touches upon poetry, fine art, rhetoric, and political science. Perhaps it could be defined as a history of man's attempt at finding the truth. For the love of truth is the author's main interest (p. xi), and he believes that the search for pure, uninterested truth raises mankind nearer to the divine (see e.g., pp. 164, 217, *et passim*). Historiography, which is "concerned with the accurate description of man's experience," is a science because ". . . what characterizes scientific efforts is the purpose to find the truth, as much of it as is available, and to come as close to it as

circumstances permit" (p. 303). And scientific truth to Sarton is an absolute: "We do our best to approach the truth by successive approximations; we do not claim to have the truth, but we are reaching for it and coming gradually closer to it; we do not start with the whole truth, but we obtain more and more of it" (p. 417). Sarton contrasts this attitude with that of the metaphyician who believes himself *a priori* in possession of a complete answer. But compared with the tendency of some modern scientists to replace truth by utility, Sarton's ideal is also an absolute: one can come closer only to that which has existence of its own.

Sarton's concept of science makes it independent of this or that method. In particular, it avoids identification of science with the experimental method, an identification which is inducing many to assign the birth of science to the seventeenth century. His belief in absolute truth, moreover, extends to the domain of human relations; the love of truth is paralleled by the love of justice (see e.g. p. 574). Thus, his philosophy allows him to pass judgment on the methods and results of the early scientists and to judge them as human beings too. For the history of science, to Sarton, is largely a history of individual minds, influenced but not determined by political and social events. These events are considered as a background just as superstitions are mentioned as an intellectual background, but they do not become decisive.

Even if one is willing to follow Sarton a long way in his philosophy, one need not deny that his assumptions are themselves metaphysical and carry the danger of dogmatism (see e.g. p. 436, note 16). This danger is enhanced by the immensity of the task which demands of the author that he represent a whole group of specialists, a demand which no one human being could fulfill in detail. When, in addition, the free form of lectures is preserved, arbitrariness of judgment is almost unavoidable. The teacher who by the authority of his word guides his students and stimulates them by frequent allusions to the present, easily appears to the reader as the author of a very subjective account. Thus, the reader of the present volume may be at a loss to understand why matters like the authorship of the Iliad and Odyssey have to be discussed and why Plato's philosophy has to be analysed at such length in a book that disclaims being a history of philosophy. Perhaps this merely reflects the instructor's desire to include questions of interest to his audience. Or he may have yielded to the temptation, so understandable today, to supply that part of general education which a former generation possessed as a matter of course. The educator's desire to explain the moral personality of the historical actors may also account for phrases like: "The only unpleasant feature in Epicuros' personality (and it displeases me very much) was his very ungrateful judgment of his teachers and of other philosophers" (p. 598). Once the history of science is connected with mankind's desire for salvation (see pp. 217, 399) and once this history is fundamentally reduced to the great individuals, the latter can hardly remain a matter of moral indifference. In

consequence, such a history of science tends to take on an educational aim far beyond the boundaries of the classroom.

For the medical historian, the present volume is especially interesting because it comprises the period of Hippocratic medicine. Dr. Sarton's familiarity with the original sources is impressive and the analyses of many Hippocratic works acquaint the reader with the material. It would be picayune to harp on small details where the medical historian is bound to be better informed than the author of a general work. Rather it should be stressed that there are remarkably few errors and oversights (the neglect of the gynecological and especially the embryological Hippocratic writings seems the most important). Nor would it be fair to expect the presentation of new facts or entirely new solutions of detailed problems. The outline of these chapters represents on the whole a traditional view. Dr. Sarton accepts a good deal of the Hippocrates vita (p. 337); he believes at least in a "probable genuineness" of various "Hippocratic" writings (p. 349); "the main achievement of Hippocrates" to him "was the introduction of a scientific point of view and scientific method in the cure of diseases, and the beginning of scientific medical literature and clinical archives" (p. 345), and he attributes the prevalence of prognosis over diagnosis largely to medical (rather than social) motives; moreover, he considers the Hippocratic "Oath" a document "probably administered from the golden days of the Coan school" (p. 376). But during the last two decades, chiefly due to Dr. Edelstein's work, the traditional outlook has been seriously challenged. In particular, there is doubt as to whether we can accept on trust any part of the Hippocrates vita beyond the few remarks in Plato and Aristotle; whether we have any means of gauging the genuineness of a "Hippocratic work," whether the emphasis on prognosis may not be due to the necessity of the physician to assert himself, and whether here and elsewhere the "scientific" interest has not been overestimated, and finally, whether the "Oath," far from being representative for the Greek medical profession, may not have originated in a small circle with Pythagorean background. In his footnotes, Dr. Sarton mentions the works where these views can be found, but it would have been desirable to have his reasons for paying scant attention to their contents. They are important enough to deserve careful consideration. If the Hippocratic books are the mere remainder of the medical literature of about 400 B.C. which happened to survive into a later period, then they do not give a full picture of what was and what was not known to the Hippocratic physicians (see p. 342). It is true that these questions need the help of the philologists and for them Dr. Sarton has little use as he makes clear in unmistakable terms (see pp. vii ff., 348, 350, 362).

In short, Dr. Sarton has written a very personal book. However, it will be agreed that the book reflects the enthusiastic devotion of the author to his subject. Through his *Introduction,* his other publications, and the editorship

of *Isis*, Dr. Sarton has set an example of indefatigable zeal. May the present volume and its successors serve to gain new friends for the history of science!

DOUGLAS MCKIE. *Antoine Lavoisier, Scientist, Economist, Social Reformer.* New York, Henry Schuman, 1952. 440 pp. $6.00.

Reviewed by DENIS DUVEEN, *Fellow of the Royal Institute of Chemistry (England), New York, New York*

IT would be difficult to parallel the romantic marriage, the scientific and social achievements, and the dramatic and tragic death of Antoine Laurent Lavoisier (1743-1794). The son of substantial, middleclass parents, he soon showed promise of a brilliant scientific career. Elected to the *Académie Royale des Sciences* at the exceptionally early age of twenty-five, he not long after bought his way into the *Ferme-générale*—an organization which collected taxes, on a profit-making basis, on behalf of the king. This connection provided the young Lavoisier with sufficient funds to carry out his extensive and costly researches, resulted in his marriage, which provided him with a charming companion and talented helpmate, and finally brought about his legalized assassination under the "terror" of the French revolution.

Lavoisier's studies on combustion led to his successful attack on the antiquated phlogiston theory and the foundation of modern chemistry. He also played a leading part with Guyton de Morveau (1737-1816), Berthollet (1748-1822), and Fourcroy (1755-1809) in introducing a new nomenclature to replace the jargon of the alchemists which was still employed by the chemists of his time. This nomenclature has remained in use virtually unchanged to the present date.

His talent for clear thinking and concise writing was soon appreciated by his fellow academicians and members of *Ferme-générale*. Both groups appointed him to numerous commissions and committees on the most varied subjects. The members of these bodies nearly always chose him to write the reports—an assignment which he was wont to accomplish in particularly fine style.

Lavoisier's work with Laplace (1749-1827) created and established calorimetry as a new auxiliary method in chemistry. It also demonstrated that respiration was in every way a very slow combustion process and led to his later work with Séguin (1765-1835) which consisted especially in an experimental study of respiration and transpiration in the human body and laid the foundation for modern metabolic study. Apart from his purely chemical and scientific researches, Lavoisier made outstanding contributions to various other fields of human enterprise. As a member of the gunpowder commission, he was directly responsible for increasing the production of saltpeter and improving the quality of the gunpowder.

Lavoisier was a recognized authority on matters financial and, after having served as president of the highly important *Caisse d'Escopte*, he was offered by the King the post of *Ministre des Contributions Publiques*. With

his *De la Richesse Territoriale du Royaume de France* he showed his grasp of the economy of the kingdom and provided a milepost in the history of political economy. He organized and maintained the first experimental farm on his estate at Fréchines and showed in his *Instruction sur le Parcage des Bêtes à Laine* his intimate knowledge of the details of farming.

In his *Réflexions sur l'Instruction Publique,* he deals at length with the general economic and social advantages to be derived from having a better educated citizenry. He also considers in a sound way the best methods of achieving this.

The Parliament of Orléans was kept going almost entirely by Lavoisier's energy, and his liberal and progressive political views are to be found in its deliberations. His appointment as substitute deputy for the district of Blois to the States General shows the prestige he must have enjoyed among his contemporaries.

All this fascinating and absorbing material, and more besides, has been woven by Dr. McKie into the very readable story of the remarkable life of one of France's, and the world's, greatest and most universal geniuses. The volume is pleasantly printed on a good quality paper but suffers from the very inadequately reproduced illustrations. A substantial bibliography and a comprehensive index complete the book, which is to be recommended to all those interested in the history of chemistry, medicine, or any form of human endeavor.

Antonii Benivienii De Regimine Sanitatis ad Laurentium Medicem, edito da Luigi Belloni. Pubblicazione della Società Italiana di Patologia in occasione del II Congresso (Torino, 8-10 giugno 1951). 52 pp., 8 pl.

Reviewed by Dorothy M. Schullian, *Curator of Rare Books, Armed Forces Medical Library, Cleveland, Ohio*

For a reviewer who once wrote a dissertation on literary patronage in ancient times it is peculiarly gratifying to welcome the *editio princeps* of a regimen written for that most enlightened and generous of Renaissance patrons, Lorenzo the Magnificent, and now fittingly published through the aid of a modern Maecenas, Professor Piero Redaelli.

The occasion for publication was the Second Congress of the Società Italiana di Patologia, held at Torino 8-10 June 1951. The choice of editor was apt, since Dr. Belloni is himself pathologist, medical historian, and humanist. The choice of author was also apt, for the name of Antonio Benivieni is eminent in the history of anatomy and pathology for the treatise *De abditis nonnullis ac mirandis morborum et sanationum causis,* published in part and posthumously at Florence in 1507 by his humanist brother Girolamo. That treatise is currently receiving much attention not only in Italy, but also in Germany, England, and the United States. We are therefore grateful to have available in convenient and charming form Antonio's earlier tract, the regimen which was his first medical work and which he undertook about the year 1470 when he abandoned his literary

studies to turn definitely to medicine. That he enjoyed the patronage of the Medici family in both his literary and his medical efforts is evidence of his ability and of their liberality.

In a succinct introduction provided with informative and accurate notes Dr. Belloni traces the beginnings of objective observation in human anatomy and summarizes the contributions of Benivieni in that and other fields. He points out that, by contrast with the *De abditis causis,* any regimen of this period, whether general or specialized, is less scientific in character than popular and didactic; that it generally avoids new ideas and bases its assertions on classic texts, and that it is therefore more an expression of the traditional mentality of the Middle Ages than an indication of the new investigative spirit of the Renaissance. All this is true of Benivieni's regimen, which leans heavily on the Greek and Arabic writers and above all on Avicenna. Its first book discusses in succession generation, digestion and nourishment, agents which can harm the body, the health of infants, and the health of children. The second deals with those elements so often stressed in these regimens, the *sex res non naturales*—air, meat and drink, exercise, sleep and walking, emptiness and fulness, and the emotions; it ends with a chapter on geriatrics. Benivieni picks and chooses throughout from his classic sources, writing in the main as physician-philosopher and scarcely as yet revealing the beginnings of the evolution which was to make him the physician-naturalist of the *De abditis causis.* The regimen is especially interesting in view of the later tract.

The edition is based on Cod. Marc. lat. VII 29, which was probably the dedicatory copy, and ff. 92-106 of Cod. Vat. lat. 3842. The text has been carefully and lovingly prepared according to the best canons of palaeography and philology. It is beautifully printed on heavy paper, with lavish margins, and it is enhanced by eight sparkling illustrations. Six of these reproduce representative pages from the Venetian manuscripts; the other two carry fitting portraits of Antonio and of Lorenzo. The modern patron has furnished for the cover a sketch which unites the stemmata of their two families. The edition is fully worthy of its sponsorship, and it continues a tradition of learned publication which scientific societies in this country might well follow more often on the occasion of their annual gatherings.

C.-E. A. Winslow. *Man and Epidemics.* Princeton, New Jersey, Princeton University Press, 1952. [ix] + 246 pp., illus. $4.00.

Reviewed by John B. Blake, *Department of the History of Medicine, Yale University; Candidate for the Ph.D. degree in History, Harvard University, Cambridge, Massachusetts*

In this book intended primarily for the general reader, Dr. Winslow provides a picture of the sanitary accomplishments of western Europe, England, and the United States, and points out the need for bringing these same achievements to the rest of the world. In an introductory chapter he sets forth the problems and purposes of public health and traces in broad out-

line the development of epidemiology from Hippocrates to Pasteur and his followers. Stages of development of the public health program are represented by the sanitary awakening of a hundred years ago; twentieth century emphasis on the promotion of personal hygiene, in connection with tuberculosis and infant mortality and primarily by educational methods through the instrumentality of the public health nurse; and the organization of medical services for the early diagnosis and "constructive" treatment of disease. Finally, to achieve the current ideal of complete physical and mental well-being, Dr. Winslow points out the need to develop the social machinery which will provide everyone with an adequate income, or the health service that income will buy.

The bulk of the book is taken up with describing one phase of current public health practice, sanitation of the environment. Considering first the intestinal diseases, Dr. Winslow describes as a typical example the development of medical theory with regard to the transmission of typhoid fever and means of combatting it. Successive chapters cover the development of pure water supplies, sanitary sewage and garbage disposal, safe milk supplies, and sanitation of other food products. Turning next to insect-borne diseases, he outlines our knowledge of malaria, yellow fever, bubonic plague, and typhus, and the measures which have been used to conquer these diseases in western civilization.

Through the application of sanitation, the expectation of life in the United States and western Europe has advanced greatly in the last fifty years. This is not true, however, for much of the rest of the world, which cannot survive, he declares, "half sick and half well, half rich and half poor." Planned attacks on the twin problems of poverty and disease by technical assistance to the underdeveloped countries through such United Nations organs as the World Health Organization, the Food and Agriculture Organization, and the International Labor Organization provide future challenges for the sanitarian and "the only hope of building a stable and contented world."

Throughout, Dr. Winslow builds his account of the principles and practices of environmental sanitation on their historical background, thus aiding the reader to understand those principles and demonstrating what their application has meant for the health of more fortunate lands. The book is not essentially an historical work, and the historian of public health is unlikely to find anything new. The scholarly apparatus—five pages of selected references—is minimal. This is not a criticism, for the work is not addressed to the specialist but to those "among the general public who are interested in the progress of modern knowledge, who would like to know by what roads the science of public health has reached its conclusions and what results it has achieved." Within the field of environmental sanitation—the first, the basic, and probably the most successful field in public health—this purpose is admirably achieved. The book is readable and attractive and covers its ground well. It is refreshing, too, to see a work which

emphasizes such prosaic matters as pure water, too often taken for granted, rather than the dramatic "miracles" of modern medicine. Many will no doubt find in the final chapter statements with which they will disagree. This, however, should not be a novel experience to one who for so long has played a leading rôle in advancing the cause which here he ably pleads.

ERNEST SACHS. *The History and Development of Neurological Surgery.* New York, Paul B. Hoeber, Inc., 1952. 158 pp., illus. $5.00.

Reviewed by SAMUEL C. HARVEY, *Professor of Surgery Emeritus, Yale University School of Medicine, New Haven, Connecticut*

THIS interesting and informative history is published under the auspices of the Department of the History of Medicine of Yale University with which the author is now associated. Dr. Sachs is unusually well qualified to undertake this task by reason of his experience in neurosurgery, beginning with two years under Victor Horsley at a time when he was intensively exploring by surgical methods the field of neurology in the laboratory and the clinic. From then until the present the author has been intimately concerned with the extraordinary fruition of neurosurgery and conversant with those who have been responsible for it.

About one-third of this volume covers the neurological and surgical backgrounds insofar as they were contiguous, beginning with the neolithic culture and extending down to the reformation of surgery by Lister and the development of neurology in which the advancement of knowledge was equally striking. The wedding of the two, while in retrospect surprisingly rapid—a matter of a generation only—was not consummated until surgery not only acquired the operative skill peculiar to this field but also contributed materially to an understanding of its physiology, pathology, and diagnosis. This is well described under the heading of "The Listerian Era and the Beginnings of Neurological Surgery."

"Modern neurological surgery" begins, according to the author, with the truly major contribution of Dandy in 1918, the introduction of ventriculography. By this means diagnosis was made more definitive than had been the case previously where the clinician depended entirely upon the history and physical findings. It is well to keep in mind, however, that these comprise, even today, the fundamental background of diagnosis in neurology and cannot be dispensed with. These had been highly developed by the neurologists, so that in many instances the precision of diagnosis was remarkable, and to a degree was, with the classification of diseases of the nervous system, an end in itself. Confirmation was obtained only by necropsy, and therapy was in the main symptomatic. This is well exemplified in Oppenheim's weighty *Lehrbuch der Nervenkrankheiten,* the first edition of which was published in 1894 and the last, the seventh, in 1923. It was a classic to a generation of neurologists and invaluable for surgeons entering this field. Such diagnosis and classifications of disease is not, I hope,

antiquated or obsolete, the antithesis of "modern," nor does, I am sure, the author consider it so.

While this development of neurosurgery was taking place, the technique of operative surgery was likewise changing for the better. Though this is emphasized by Dr. Sachs, it is perhaps too briefly so. General surgeons were called upon in the earlier days as technicians to operate under the guidance of the neurologist. As a rule their ability was evaluated by the speed with which the operation was accomplished and this involved all too frequently rough handling of the tissues and extensive loss of blood. It was perhaps necessary before anesthesia was available, for then the pain of the procedure was agonizing to both the patient and the surgeon; speed shortened this at least, and hemorrhage, without a major vessel was involved, could be for the moment disregarded. Halsted recognized that the patient could remain under well-given anesthesia for hours without serious damage and that therefore time could be well taken to handle tissues gently and to control hemorrhage. It may have been quite fortuitous but nonetheless beneficial that Cushing was trained as a general surgeon by him and carried this philosophy over into neurosurgery, demonstrating there its effectiveness at a time when the present-day adjuncts to hemostasis were not available. Ironically, it has come about that many general surgeons have acquired at second-hand the Halstedian technique from the neurological surgeon.

In his last chapter the author briefly summarizes the scope of work of the neurosurgeon today by discussing, one after another, the various diversified areas in which he now operates.

There is a remarkable amount of information packed into this relatively small volume, yet the narrative runs smoothly and it is easily read. The illustrations are well chosen and pertinent to the text, although some impertinent goblin labelled Claude Bernard as Lord Lister—a kind of deviltry to which no writer is immune. In the bibliography there are some 540 references, and the index is adequate and competent.

R. C. Brock. *The Life and Work of Astley Cooper.* Edinburgh and London, E. & S. Livingstone, Ltd.; Baltimore, Williams & Wilkins Co., 1952. viii + 176 pp., illus. $4.50.

Reviewed by Lloyd G. Stevenson, *Associate Professor of Medical History and Literature, Faculty of Medicine, University of Western Ontario, London, Canada*

Anyone interested in the history of surgery will of course be interested in Astley Cooper. It is not that he was the greatest surgeon of his age, although perhaps no more than half a dozen others approached his stature, still fewer rivalled his fame. It is not that his contributions to surgery were epochal, although their importance cannot be disputed and Mr. Brock quite rightly deplores the condescending tone adopted by Bettany in the *Dic-*

tionary of National Biography. What chiefly lends abiding interest to Cooper is his crucial place in the history of the profession in Great Britain. One might even argue that he is the central figure in this great surgical tradition. Far more than Abernethy, he was responsible for driving home certain practical lessons from the teachings of Hunter. The very model of the "scientific surgeon," and at the same time the outstanding teacher of surgery to a generation, he impressed upon his colleagues and pupils the value not only of anatomy, human and comparative—his best known contributions are anatomical, although here he shares the palm in an established convention with many others—but also of experimental surgery, physiology, and pathology. By divesting Hunterian doctrines of a large part of that metaphysical and speculative element which Abernethy stressed and extended, Cooper made them more understandable, more acceptable to practical surgeons. Most practitioners today would find Cooper's lectures more congenial than Hunter's, not merely because he was a better writer, but because his writings are more strictly surgical, and in a sense more "modern." Again, his experiments, if less original, are often more convincing.

Cooper imposed certain limitations on the *imitatio Hunterii*. It is true that he modelled much of his life, even to his daily routine, on Hunter. He dissected everything from an eel to an elephant. He collected museum specimens with Hunterian zeal. But it was not alone the difference of temperament and talent which made him a better practitioner and a better operator than his master; there was also a divergence of interest. It is significant that his great collection, unhappily dispersed and in part destroyed, contained a far higher proportion of preparations in surgical pathology than Hunter's collection. Mr. Brock has hailed *The Anatomy of the Thymus Gland* as "a most unexpected contribution from a surgeon" and a "piece of work in pure science." But when one surveys the whole range of Cooper's publications, it is not unfair to recall his aphorism: "Deep science is desirable to the man of fortune, useful science to the physician and surgeon." Lest this be misunderstood, it is desirable to notice also the topics which he assigned for the Astley Cooper Prize: "1. The structure and use of the thymus gland. 2. The structure and use of the spleen. 3. The structure and use of the thyroid gland. 4. The structure and use of the capsulae renales. 5. On the state of the blood and the blood-vessels in inflammation, ascertained by experiment, injections, and observations by the microscope. 6. On the cause of coagulation of the blood."

Arrangement of his material is the basic problem of the biographer. Is he to write first of all a "Life" and then deal separately with the "Work?" Or is he to treat the various parts of his hero's work in chronological order as they arise, repeatedly interrupting his narrative? The first plan has the disadvantage of attempting to separate elements which are often quite inseparable. The second not only breaks up the narrative of the life, but also in many instances separates pieces of work which, although carried out at different periods, clearly belong together; nevertheless it is probably the

better choice for a short book. Modifications of both plans have been tried with varying success. The scheme adopted in the present work is not a happy one. Starting from Cooper's birth in 1768, apparently with the object of proceeding to his death in 1841, Brock follows him in his career, with some attention to the work of surgeon, teacher and author. He then breaks off in mid-passage to write a series of essays—"The Surgeon," "Amputation at the Hip-Joint," "Publications," "Lecturer and Teacher," and so forth—containing biographical information which ranges over the whole life. The chronological narrative is then resumed where it was left off. Before "The Final Scene" is reached, there occurs that ominously titled chapter, "The Man and His Personality," which so often constitutes the biographer's admission of failure. In a book which may be read in an evening there is far too much repetition in consequence of this arrangement. Benjamin Travers' description of Cooper is given twice. Cooper's estimate of himself is given twice. Almost everything is given twice. Sir Astley retires so often, so often returns to the prime of his career, that the reader soon begins to feel like a spectator at tennis.

As a biography, *The Life and Work of Astley Cooper* contains little that is new. Some of the errors of Bransby Cooper and others are corrected, a few new ones introduced. For example, a comparison of the first page of the text with the caption to the frontispiece shows a little laxity in the matter of dates. There is also the usual anxiety to defend the subject at every point, so that Cooper's renunciation of his political principles at a crisis in his career—which can hardly seem better than pusillanimous—is represented as the part of wisdom and virtue. This is scarcely necessary since it is almost the only reproach which can possibly be sustained against a noble, generous, and altogether attractive character. Cooper's nepotism, which aroused the ire of Wakley, is properly dealt with in the context of the period and is discussed frankly. The circumstances which gave rise to his ingenuous admission that a family party flourished under his wing (p. 135) should be recalled by his biographer. It was Cooper's denunciation of the routine abuse of mercury in the Borough Hospitals which led to reform, and he was publicly defending himself from a charge of ill-will against the Hospital surgeons when he pointed out how many of them were his nephews, godsons, and apprentices. Although there is more than one reference to Cooper's regular attendance at the Physical Society, no indication appears that its very interesting minutes, preserved in the Wills Library, have been consulted.

As an account of Cooper's work, on the other hand, this book must be highly recommended. Himself a distinguished surgeon, the author has written of Cooper's research and practice in relation to hernia, arterial surgery, orthopedics, and the other problems which he attacked, in a way that surgeons will approve. He has shown how carefully and intelligently Cooper's great operations were thought out. He has shown very clearly, too, how science and practice were linked together. He has demonstrated

the importance of his subject in the history of British surgery somewhat in the manner outlined at the beginning of this review. He has not neglected the minor points—such as Cooper's abortive experiments with catgut—and has discovered in one of the manuscript museum catalogues in the Royal College of Surgeons the record of a case in which Cooper successfully practised the free grafting of autogenous skin. All this is eminently satisfactory. It ought to be mentioned that Valsalva had tied both carotid arteries in a dog, an experiment the reader is likely to suppose original with Cooper. A few words—no more are needed—should account to the modern reader for a course of surgical lectures dealing with such diseases as scrofula. But these are minor shortcomings. The chief purpose of the book has been well carried out in defining Cooper's achievements. A useful bibliography and index are appended.

SIR EDMUND CRASTER. *History of the Bodleian Library, 1845-1945*. Oxford, at the Clarendon Press, 1952. xii + 372 pp., illus. 42s.

Reviewed by DONALD G. WING, *Associate Librarian, Yale University, New Haven, Connecticut*

WHILE Sir Edmund Craster insists that his *History of the Bodleian Library* is unofficial, it plainly obviates the need for anything more official. Between its covers there is much to interest anyone at all curious about the last hundred years in the world's greatest university library. The story has been told—in the form of annals—down to 1880 by the Reverend William D. Macray, but to give fuller details and sufficient perspective to our own times Sir Edmund has gone back to 1845 in this volume. After describing the Bodleian as it was in that year, the following century is divided in three parts—the administrations of Bandinel and Coxe (1845-81), Nicholson (1882-1912), Madan, Cowley, and Craster himself (1912-45). In an epilogue the more salient changes are acutely observed:

"Where there had been a single reading room there now were eight. Electric light had been introduced and whereas the library had formerly closed its doors at four in the afternoon, or even at three in the winter, the Bodleian now remained open until seven throughout the year, and the Camera and the Radcliffe Science Library until ten at night. Extension of hours, additional reading-rooms, and the innovation of placing thousands of select books upon open shelves had combined to produce a vast increase in the number of those who made use of the library. A hundred years ago there were no undergraduates and no women readers. . . . In 1845 the entire staff was no more than nine, . . . now (in 1951) the number of library employees stands at 147." The annual revenue increased from £4,650 a year to nearly £90,600, and the holdings from a quarter of a million books to over a million.

Medical books and manuscripts have never figured largely in the resources of the Bodleian. Except for individual donations the first sub-

stantial collection to be acquired seems to have been the medical and scientific library, in 1260 volumes, of Dr. Martin Lister, turned over by the Ashmolean in 1860. At the same time came the manuscripts of Dr. Richard Napier. In general, however, science was left to the mercy of the Radcliffe Library, where books could be borrowed. The Camera became a general reading-room in 1862 but it was not until 1927 that its resources were handed over, and not until 1934 with the new building that Bodley could accommodate its 170,000 volumes.

A large part of Bodley's pre-eminence occurs from its enviable position as a library of deposit under the Copyright Act of 1842. It has twelve months in which to demand a free copy of any book published in the United Kingdom. Deposit of copies in the British Museum is obligatory and that is well (as in our own Library of Congress), but it was argued convincingly that a single copy in London is insufficient protection against loss. On the other hand, we may be glad to be spared the recurring investigations of three kinds of commissions: Royal (1850 and 1920), University (1850, 1852, 1871, and 1877), and Library (1931).

It would be well if all great institutions made this sort of report at least every century; and lucky is the one who finds an historian as judicious and inclusive as the late Sir Edmund Craster.

HARLEY WILLIAMS. *Doctors Differ.* Springfield, Illinois, C. C Thomas, 1952. 259 pp. $5.50.

Reviewed by MORRIS C. LEIKIND, *Chief, Historical Research Division, Armed Forces Institute of Pathology, Washington, D. C.*

THIS book is an American issue of a work published in England in 1946. The author, Mr. Williams, who is a most prolific writer, subscribes to the "great man theory of history" and for him the history of medicine is nothing more nor less than the sum of the biographies of its heroes. The reader is presented with a portion of this history depicted in the lives and accomplishments of seven major figures and a number of minor ones, the latter being minor only in that they serve to form the background against which the larger figures are described. The seven physicians and surgeons include five Englishmen, one American, and one cosmopolitan, the ubiquitous William Osler.

John Elliotson, who attempted to adapt mesmerism or hypnotism to medical practice, is the first of the seven doctors. Then follows an account of Hugh Owen Thomas, scion of a family of Welsh bonesetters who became the father of orthopedic surgery. James MacKenzie, internist and cardiologist, and William Osler, physician extraordinary, teacher, and humanist, are next dissected by the probing scalpel of Mr. Williams. The work of William Macewen and his pioneering excursions into brain surgery are briefly presented. He is contrasted with Victor Horsley, but despite the

fact that the author makes a few remarks about their successors, the name of Harvey Cushing is conspicuous by its absence.

Lastly, the author discusses the lives and work of Robert William Philip and Edward Livingstone Trudeau, who did so much to rationalize the treatment and care of the tuberculous patient.

That "Doctors Differ" there is no doubt, but why they differ is not so obvious. Nevertheless, it must be admitted that even if the author did not succeed in explaining why his doctors differ and what the significance of the differences is, he did succeed in entertaining the reviewer. Perhaps he will do the same for other readers. There are several portraits but no bibliography or index.

PAUL DIEPGEN. *Geschichte der Medizin.* II. Band: I. Hälfte: Von der Medizin der Aufklärung bis zur Begründung der Zellularpathologie (ca. 1740-ca. 1858). Berlin, Walter de Gruyter, 1951. viii + 271 pp. 22 illus.

Reviewed by OWSEI TEMKIN, *Associate Professor of the History of Medicine, the Johns Hopkins University, Baltimore, Maryland, and Editor, Bulletin of the History of Medicine*

MEDICINE, during the interval of *circa* 1740 to 1858 covered by the present volume, was rich in achievements as well as in variety of thought. Dr. Paul Diepgen, formerly Director of the Berlin Institute of the History of Medicine and Science, has tried to do justice to the many outstanding personalities and events as well as to the main lines and backgrounds of the development.

The clarity of the author's style has first of all to be acknowledged. To give an example, his is one of the most lucid presentations of Robert Mayer's discovery of the conservation of energy (pp. 94 ff.). As far as the factual coverage is concerned, the number of actual mistakes seems to be within the limits of what is unavoidable in an undertaking of similar magnitude. Since, as the author states (p. v), he did not set out to write a handbook for professional medical historians, he has omitted mention of things some readers may consider important. To some extent, this attitude is understandable. However, with the total omission of the English public health movement and of such names as Chadwick, John Simon, John Snow, he goes too far and impedes an understanding of the development of epidemiology and public health, and even of the work of Pettenkofer, which is discussed at length. On the other hand, even professional medical historians will probably find material with which they were not formerly conversant. This reader, for instance, appreciates the information given on page 115 concerning the antecedents of the doctrine of the "Zellstaat." Altogether the book conveys a clearly presented body of major facts between 1740 and 1858.

But I am afraid that the picture of the development as a whole is not clear. The author has divided the volume into two sections: "Medicine under the sign of the Enlightenment (*c.* 1740-*c.* 1830)" and "Medicine

from the foundation of the cellular theory to the foundation of cellular pathology (*c.* 1830-*c.* 1858)." Each of these sections has somewhat similar subdivisions beginning with the political, philosophical, technical, and general scientific events of the period. The author felt the need of explaining medical developments against the background of more general factors, but in this he has not wholly succeeded. In many cases, the general influences do not appear sufficiently marked in the special disciplines to deserve double treatment. In particular, the accounts of ophthalmology, otolaryngology, and forensic medicine seem interrupted without any noticeable advantage. More important perhaps, the attempt to explain things in the light of their own times is counteracted by a different concept, viz., that the Enlightenment with its rationalistic philosophy and budding experimental science prepared, and the first half of the nineteenth century brought to the fore, those elements which marked the unprecedented rise of medicine during the succeeding hundred years (p. v). This concept accounts for the author's inclination to view the work of the past relative to its bearing upon modern achievements and to dispense good and bad marks as he goes along. It also accounts for his impatience with such a movement as romantic medicine which does not fit into the picture of a more or less straight development. Not only are romantic medicine and *Naturphilosophie* included under the general heading of Enlightenment, but the author is also guided by his dislike of their obvious shortcomings rather than by an endeavor to understand their imprint upon the minds of many medical men.

In fairness to the author it has to be admitted that medical historiography is faced with a real difficulty. As physicians and scientists we must take our present knowledge as the standard of truth; as historians we tend to understand the past in its own right. Perhaps the author will be able to find a better solution of this dilemma in the next and final volume of his History of Medicine.

Abbé H. Breuil. *Four Hundred Centuries of Cave Art.* Translated by Mary E. Boyle. Realized by Fernand Windels. Montignac, Dordogne, France, Centre d'Etudes et de Documentation Préhistoriques (1952). 417 pp. 4 vols. £7.3.0.

Reviewed by Cornelius Osgood, *Professor and Curator of Anthropology, Yale University, New Haven, Connecticut*

One day in 1868 a hunter picking his way through the Cantabrian hills in northern Spain came upon the entrance of a cave hidden by a fall of rock. Intrigued by this discovery, a local archeologist began excavating its floor in search for specimens. His five-year-old daughter Marie, being small, looked up, and so made one of the epochal finds of history. What she saw was a painting of an animal on the ceiling, one of many comprising the superb frescoes in the cave. They were incredibly old. When the archeologist published his account in 1880 there was a flash of learned argument

in which the savants of Europe discredited the age and authenticity of the paintings. They did not go to see them. The cave of Altamira was distant. It was also damp and dark.

In 1901, more than twenty years later, the painted caves of Font de Gaume and Les Combarelles were discovered in southern France. Then Altamira was remembered and the archeologists hastened to make amends. In the vanguard of the protagonists was the young Abbé Henri Breuil who painstakingly copied the lines and colors of the primitive artists. Lying on his back in poorly lighted caverns, he devoted himself to the expert interpretation which the work of recovery required. Thus through his appreciation over a period of fifty years he contributed most to our knowledge of the world's first examples of truly creative genius. *Four Hundred Centuries of Cave Art,* his last book, is one of a long line of magnificently illustrated works. It is distinguished by presenting a balanced survey of paleolithic paintings, engravings, and sculptures which happen to be concentrated almost entirely in southwest France and northern Spain. This volume combines copies of the Breuil restoration with photographs of the originals, thus providing opportunities for appreciation not afforded even by arduous visits to the caves themselves. The prefatory writing and the esthetic theory may seem sometimes quaint, sometimes dated, but they are never detrimental to one's pleasures. The descriptive data concerning the caves are clearly presented.

Whatever may be one's realm of interest or however demanding one's occupation, a few hours will not be wasted in looking at these pictures. Tens of thousands of years ago man's ancestors faced a world of wild beasts. The fears of these ancient men we can only surmise; what they have left for us is inestimable beauty.

DANIEL DRAKE. *Practical Essays on Medical Education and the Medical Profession in the United States.* With an introduction by David A. Tucker, Jr. Baltimore, The Johns Hopkins Press, 1952. xvi + 104 pp. $2.50.

Reviewed by WILLIAM B. WALKER, *Department of the History of Medicine, Yale University; Candidate for the Ph.D. degree in the History of Medicine, the Johns Hopkins University, Baltimore, Maryland*

THESE essays offer sound evidence to support the contention that Daniel Drake was a leader whose ideas ranged far ahead of the prevailing trend of medical opinion in the early 1800's. Although he speaks as a man of his time in giving attention to the mode of instruction within the preceptor-apprentice relationship, he manages to add that empirical instruction must be supplemented by relevant texts, and the amount of knowledge gained should be tested frequently by weekly oral quizzes as well as more infrequent written examinations. Perhaps in this instance succeeding generations of medical students might wish that history had not so emphatically vindicated the good doctor's judgment.

Drake was perceptive enough to see that his profession was undergoing transition, and that progress would have to be made by discarding habitual errors of the past as well as by acquiring new knowledge in the future. He saw, too, that society would come to demand a higher standard of proficiency commensurate with this; in proposing reforms he particularly urged improved methods to obtain an adequate number of cadavers for anatomical dissection and instruction of students, and the dropping of patents awarded solely for the administration of drugs. He drew clearly the picture of an ideal community—to be multiplied many times throughout the country—supplied with doctors graduated from a strategically located regional medical school. The standards of these schools would be raised to a high level, so as to make a diploma worthy as the sole qualification for practice, and to render largely superfluous the licensing systems which Drake deprecated as working at cross-purposes with educational improvements.

Perhaps a sharper example of the progressive bent of his thought is furnished by the detailed proposals for such an improvement in the medical curriculum. Drake was aware of the need for a logical sequence in the progression of medical studies—an idea which was to bear fruit in the eventual establishment of a graded course. He felt, also, that instruction should be more thorough, and advised that this be carried out by lengthening the sessions to five months each, by requiring attendance at the sessions for four years, by providing for more stringent examinations, and by constituting a faculty with one member devoted to each one of at least six major subjects: anatomy, institutes of medicine, practice of medicine, surgery, materia medica, and chemistry.

Dr. Drake's most significant contribution appears, however, to lie in his remarks about the practitioner. Citing the need for surgeons, he deplores the preponderance of physicians, but ironically assigns this to the fact that the mistakes of the latter are less evident in their practice! He feels that these two divisions should be re-united—not because of the exigencies enforced by colonial times, but because each can realize its full potential only through an interdependence of effort and a mutual reliance on common ground within medical science. To him, therefore, the surgeon must not remain a mechanic nor the physician an apothecary, but both should work—if in diverging directions—from the same theoretical base. This may have been the first exposition in the United States of this concept, which John Hunter had already helped to establish for the surgeon in England.

With the exception of one lecture in an acknowledged declamatory style, the contents are refreshingly free from burdensome prose. David A. Tucker, Jr. has provided a brief and authoritative introduction, and the Johns Hopkins Press has furnished a pleasing format. This little book should prove entertaining and informative for both the practitioner and historian of medicine.

PAUL E. BECHET. *A History of the American Dermatological Association in Commemoration of its Seventy-fifth Anniversary 1876-1951.* Foreword by Henry E. Michelson. New York, Froben Press, Inc., 1952. 392 pp. $10.00.

Reviewed by MAURICE J. STRAUSS, *Clinical Professor of Dermatology, Yale University School of Medicine, New Haven, Connecticut*

To know Dr. Bechet is to realize that his main interest is in personalities. At his hands, the history of the American Dermatological Association becomes a recital mainly of the facts about each of the members rather than the accomplishments of the Association itself. The book contains a fairly complete biographical sketch of every member but does not give any comprehensive picture of American dermatology as embodied in this important society. It will at least be a tool which future generations may consult for information about early American dermatologists.

NEVILLE M. GOODMAN. *International Health Organizations and Their Work.* With a foreword by Sir W. Wilson Jameson. Philadelphia and New York, The Blakiston Company, 1952. xi + 327 pp., illus. $6.50.

Reviewed by GEORGE ROSEN, *Professor and Head of the Department of Public Health Education, School of Public Health, Columbia University, New York, New York*

THIS is a thorough survey of the attempts of governments to reach international agreement on various problems of mutual concern, and of the organizations set up in the last century to achieve these ends. In view of the increased interest in international health questions at present and the lack of any recent publication on the subject, Dr. Goodman's comprehensive survey fills a definite gap in the literature. Having served on the governing bodies of the Office Internationale d'Hygiene Publique and the Health Organization of the League of Nations, and as a senior official in the secretariats of UNRRA and the World Health Organization, the author is well qualified to deal with his subject. Most of the volume is devoted to recent organizations and work in this area. The first chapters discuss the need for international health, the history of quarantine and the evolution of international health organizations, and the work of voluntary agencies in the international health field. There are a number of useful appendices listing the international sanitary conferences and conventions of the nineteenth and twentieth centuries, the presidents and directors of the Office Internationale d'Hygiene Publique, the principal dates of the Health Organization of the League of Nations and of UNRRA, the constitution of WHO, the budgets of WHO for 1949, 1950, and 1951, the principal dates of regional organizations, and other related data. This is a useful and comprehensive volume which should interest not only medical and public health workers, but all those interested in the evolution of international co-operation.

ROBERT COOPE, COMPILER. *The Quiet Art. A Doctor's Anthology.* Edinburgh and London, E. & S. Livingstone, Ltd., 1952. [10] + 284 pp. $3.00.

Reviewed by PETER PINEO CHASE, *Consulting Surgeon to the Rhode Island, Providence Lying-in, and Miriam Hospitals, Providence, Rhode Island, and Editor, Rhode Island Medical Journal*

A clever doctor and his clever wife looked at the title of this book and expressed surprise at its contents. The phrase does seem somewhat anachronistic in this day of screaming headlines about many mediocre medical papers and TV broadcasting of surgical operations. But the title-page shows that Virgil thus spoke of the practice of medicine, and well-chosen extracts from the time of the Old Testament or earlier down to physicians still active emphasize this pleasing viewpoint to many of us.

Sir Russell Brain, the eminent and most felicitously named neurologist, contributes a pleasing foreword in which he rejoices in the relationship between physicians and literature. Not all the writings here, however, are from the pens of physicians. What others have said of us is included and saves the book from the stuffiness of self-praise. Bernard Shaw may be relied upon to keep us in our place.

The compiler must have spent many pleasant years roaming through the literature like Burns' "chiel amang you takin' notes." Opening the book at one place you will find remarks by John Donne on sickness side by side with an extract from the recent biography of Florence Nightingale. It is pleasing to find many quotations of American authors from Elisha Bartlett and O. W. Holmes to Harvey Cushing and W. P. Lucas' *Modern Pediatrics.* Dr. Holmes ties with Sir Robert Hutchinson at twelve quotations each. That great admirer and friend of physicians, Dr. Samuel Johnson, has eight extracts.

It would be fun to quote from the book, for there are numerous good jokes—some about us and some with us. There are also clever epigrams and much solid wisdom in larger doses. It is an unusual and excellent book. It should not be borrowed from the library and read right through as the reviewer has had to do. Rather every doctor should own a copy, keep it near his bed, and frequently ease himself down at the end of a hard day by reading a few extracts.

CHALMERS G. DAVIDSON. *Friend of the People: The Life of Dr. Peter Fayssoux.* Columbia, The Medical Association of South Carolina, 1950. vii + 151 pp. $2.75. [Sold through Davidson College Bookstore, Davidson, North Carolina.]

Reviewed by JOSEPH I. WARING, *Practising Pediatrician, Charleston, South Carolina*

PETER FAYSSOUX, son of a substantial Huguenot family, was born in Charleston in 1745, went through a preliminary medical experience with Alexander Garden, and later, with Benjamin Rush as a schoolmate, graduated

in 1769 at Edinburgh. Returning to Charleston he entered actively and prominently into the life of a community which offered considerable wealth and culture and a group of very able physicians as well as the usual number of quacks. In the Revolution he was an active participant, being chief physician in the hospital department of the southern Continental army, serving in several battles, and finally becoming a prisoner of the British, who thought enough of his ability to place him in charge of the American hospital in Charleston. Later Fayssoux became a member of the Governor's Privy Council and subsequently served actively in the General Assembly, where he worked vigorously to settle the many claims of the less prominent citizens of the state.

The author suggests that Fayssoux might be called the Father of Medicine in South Carolina, partly because of his interest and labor in promoting the founding of the Medical Society of South Carolina, of which he became the first president. Fayssoux was also prominent in the establishment of the Humane Society, the Charleston Dispensary (an out-patient institution, not a drugstore as the author states), and the Botanic Garden. It is likely that he was an able physician, but his genius appears to have been more as an organizer than as a practitioner or scientist. His surviving writings were chiefly in the form of correspondence with Benjamin Rush, to whom he wrote, "I detest writing," which statement may explain the lack of surviving medical papers.

There has been until now no adequate account of Fayssoux, and the author has brought together successfully a great deal of detail, much of which has to do with Fayssoux's personal and political life rather than his medical activities. The picture of the background of Charleston medicine is valuable, and a lengthy bibliography offers much material which might well serve as a part of a complete picture of the distinguished medical group which dominated Charleston in the latter part of the eighteenth century.

ADOLF MEYER. *The Collected Papers.* Eunice E. Winters, General editor. Baltimore, The Johns Hopkins Press, 1950-52. 4 vols. $30.00.

Reviewed by FREDRIC WERTHAM, *Practising neuropsychiatrist. New York, New York*

THE publication of Adolf Meyer's *Collected Papers* is an event. One of the most typical productions of American psychiatry and at the same time one of the best reflections of the many facets of European psychiatry is now assembled *in toto.*

It is not possible to recommend these volumes for reading either to the student of psychiatry or to the experienced psychiatrist because the material is too diffuse, too repetitious, in some parts too abstractly general and in others too highly specialized. The great significance of these volumes is historical. In relation to the other medical specialties, psychiatry is not by

any means a "new branch," as it is often called; it is a backward one. And one of the symptoms of its backwardness is the absence of historical studies, such as we have in other sciences or in literature and art, of the development of psychiatry in its concrete connections and contexts with social, political, and economic realities. It is not enough to note the relation between Pinel's work and the French revolution. It is far more difficult—and has never been attempted—to trace the subtle relationships between Kraepelin's or Freud's theories and the momentous historical developments of their time. Even the technical aspects of the progress of psychiatry cannot be understood as long as this social conditioning is ignored.

What of the historical rôle of Adolf Meyer as shown by these diversified papers? A detailed study of his position and influence in the modern development of psychopathology would in my opinion be not only interesting, but essential. It would help the present psychiatric generation gain insight into their patients and into themselves as well.

The profession's attitudes toward Adolf Meyer are hardly signs of clarity, erudition, or soundness. Some have rated him with or even above Kraepelin and Freud, others in representative scientific publications have spoken of a "Meyer legend." It is interesting that at the time of his death and of the appearance of these volumes not one obituary or review appeared even attempting to appraise Meyer's work critically, technically, and with full knowledge of the facts. Instead, one scientific journal says: "Meyer's 'life-chart' is a tool used daily by most psychiatrists," while another journal coming out at the same time says: "The life-chart is seldom used in present-day psychiatry." *The New York Times* in its obituary did not spell his name correctly (which would have annoyed him greatly) and even the Magazine of the Johns Hopkins—an institution to which he devoted so much of his life—had to jazz up its curt obituary by saying that he was particularly interested in studying "notorious criminals."

The truth is that Meyer was a bundle of contradictions. He was a really great man and at the same time, in some respects, a little man; he observed clearly and at the same time wrote many long passages (included in these volumes) which are confusing to anyone not fully initiated by long personal contact with him and a thorough knowledge of the specific problem about which he writes, be it philosophical, psychological, neurological, or psychiatric. He was a highly gifted morphologist who wanted to think physiologically. He advocated improvement of the care of mental patients and yet to my personal knowledge unbelieveable cruelty existed in Maryland and in New York with which he was acquainted but which he felt it unwise to acknowledge. He left the reputation of a great teacher, but generations of former Hopkins students are baffled in practice by the simplest psychiatric problem. He had liberal inclinations and yet the psychiatric department was the one at Hopkins which categorically refused to admit Negroes. He was a connoisseur of languages and at the same time introduced such forbidding terms as *hyperthymergasia, ergasiatrics, ergasia-*

trician, and *integrationspluralismus.* He was scientifically both progressive and critical, yet while Freud was producing his epoch-making contributions, Meyer wrote illustrated papers studying the different ear forms of mental patients.

The editing and indexing of these volumes is on the whole excellent. The first volume is devoted to neurology, the second to psychiatry, the third to medical teaching, and the fourth to mental hygiene. More of Dr. Meyer's reviews, including unsigned ones, might have been included, since he often implicitly expressed his point of view in them. In some instances the arrangement might have been better. For example, his introduction to "The Brain as an Organ," his last publication on general neuropathology, is classified under *Methods.* Some of the papers given in the original German should have been made available in English translation.

The editors of these *Collected Papers* give us little help in resolving Meyer's paradoxes and contradictions. (Meyer himself did not help us by leaving behind a volume of selected papers edited by Alfred Lief with a biographical narrative that is in important respects totally misleading.) The material remains raw material. The next stop will have to be an evaluation of the life work of a psychiatrist who has so much to teach us, both by his successes and by his failures.

EDWIN T. MARTIN. *Thomas Jefferson: Scientist.* New York, Henry Schuman, 1952. x +289 pp., illus. $4.00.

Reviewed by L. H. BUTTERFIELD, *Director, Institute of Early American History and Culture, Williamsburg, Virginia*

THOUGH there have been book-length studies on most phases of Jefferson's mind and career—on his philosophy, his political theory, his religion, his educational contributions, his architecture, his career as traveler, gardener, and so on—no comprehensive account of his scientific thought and activities has hitherto been written. The way then lay open for Mr. Martin, who is a member of the English Department at Emory University, to survey this large and fruitful field. To be sure, the field has not been unworked, for Jefferson's biographers have all given some attention to those scientific interests which bulk so large in his correspondence; and, as Mr. Martin's reference notes show, the historians of many specialized areas of science have contributed an impressive number of articles to the almost endless literature about Jefferson. But this is the first general work documenting Jefferson's own statement (written as he was about to retire from the Presidency) that "Nature intended me for the tranquil pursuits of science, by rendering them my supreme delight."

The book begins with two general chapters on "Characteristics and Attitudes" and "Principles and Practices." The first emphasizes and illustrates Jefferson's insatiable appetite for knowledge of the physical world about him ("There is not a blade of grass that shoots uninteresting to me,"

he wrote his daughter Martha) and his compulsion throughout a long life to record carefully whatever he observed. The second develops some leading principles of his scientific faith—his insistence on intellectual freedom, his acceptance and application of the experimental method, his zeal to apply the findings of science to useful social purposes, his promotion of instruction in the sciences and of the alliance of government with scientific research. No more striking illustration of most of these principles, as applied to a specific enterprise, could be pointed out than the detailed instructions President Jefferson sent to Captain Meriwether Lewis in 1803 when the latter was about to start for the unknown American Northwest. Mr. Martin has quoted briefly from this remarkable paper, which is a model of its kind and prophetic of much that was to happen in America. He would have done well to have included the whole of it, if only as an appendix to his book.

Chapters follow on Jefferson's interest in inventions and his activity as an inventor; on his contributions to vertebrate paleontology and related subjects; on his lifelong interest in meteorology and climatology; and on his controversy with Buffon on the question whether the New World is a favorable or unfavorable habitat for animal and human life. The Buffon controversy, which was protracted and brought in numerous participants on both sides of the question, is given more space than any other topic in the book and provides a useful commentary on some sections of *Notes on Virginia*. A very entertaining chapter follows on the criticism and satire aimed at Jefferson by political opponents who considered his "philosophical" hobbies dangerous, improper, or downright ridiculous. " 'Philosophy'—or science—could then signify," says Mr. Martin in summary, "an unwholesome prying into the secrets of nature for the purpose of discrediting the Bible, promoting atheism, encouraging a harmful nationalism, a deistic naturalism, materialism, the wildest ideas of the Enlightenment, chaotic and uncontrolled speculation, impracticality, confused and fuzzy thinking, tedious, trivial, and indiscriminate discussion, a modernism which would destroy the finest values of the past, Jacobinism," and so on through all the sins and crimes that Federalist clergymen, journalists, and satirical rhymesters could conjure up. Americans have evidently always distrusted any connection between politics and learning. The attacks on the late President Roosevelt for seeking advice from "college professors" constitute a recent parallel to the campaign against Jefferson for his association with scientists and scientific organizations.

The final chapter is entitled "Recognition at Home and Abroad." Here Mr. Martin admits, as the philosopher-president himself did, that Jefferson, despite his varied and sometimes intense interest in the scientific developments of his day, was always an amateur, and that none of his specific contributions as an experimental scientist were permanently significant except those to agriculture. Nevertheless, his steady and generous patronage of scientific research and his courageous upholding of scientific

ideals in the high positions he held were contributions that perhaps no other could have made. Thus his support, soon after becoming President, to Dr. Benjamin Waterhouse in introducing vaccination to the United States was decisive in this important chapter of American medical history, and other examples could be easily adduced.

Thomas Jefferson: Scientist covers an important subject with reasonable fullness, though there are so many ramifications of this subject that readers deeply versed in Jefferson will note that some things have been omitted and others compressed into mere listings. Indeed, listing is a device which Mr. Martin has frequently resorted to; it may annoy readers who want to know more about particular matters and will probably bore those who do not. The book offers no profound or revolutionary insight into Jefferson as a man or thinker. It is a competent exposition rather than a brilliant interpretation. It appears to be based exclusively on printed sources and secondary works, and for this reason alone, if for no other, it cannot be considered definitive. Its scholarship is careful, and the bibliographical notes are most useful, but unfortunately many of the quotations from Jefferson's correspondence are not precisely dated or referred to their sources. Proper names have occasionally given Mr. Martin trouble, as they do all Jefferson scholars. But only one glaring error has been noted by this reviewer. This is a double error of attribution among the portraits facing page 119. The engraving of Jefferson is certainly not by or after Mather Brown, but probably after Stuart; and the portrait of Rush is not by Peale but by Sully.

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